The FOUNDRY

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Castings in Gas Heaters Add Warmth and Cheer

SUMMER has gone and playtime at the seashore or in the north woods now are only pleasant memories. Dad is back at the daily task and five days in the week Mother must hurry in the morning to get the children away for school. Before long, Jack Frost will touch the summer foliage with his icy hand, changing the colors

The Favorite Pipe, A Good Book and Solid Comfort

to purple and red and brown. Already the chill of the early morning air is apparent and in a few more days a small amount of heat will be necessary to make the house comfortable and cheerful. During the period of transition from the beauty of fall to the sharpness of early winter, when nights are cold and the mid-day sun still has a warm smile, the furnace sometimes lacks sufficient flexibility to maintain a uniform temperature. Other methods have been developed to create the desired warmth. Gas heaters installed in the old fashioned fire places have found great favor for this between seasons heating and manufacturers of this product have developed a line to meet the individual tastes. The heavier and more expensive types of heaters are constructed chiefly of cast parts and are finished in a variety of ways, including antique brass, statuary brass and numerous bronzes.

Find Where Castings Can Be Sold

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Detroit Convention of Thirty Years

THIRTY years marks but a short span in the history of a nation. Compared with the background of recorded time, its perspective is brief. Such an interval of time can measure but a small cycle in political or economic advancement and seldom can do more than indicate a trend without defining much accomplishment. In the lifetime of man, measured from babyhood, thirty years spans the growth to maturity. It covers the period of training and preparation and usually may be taken to indicate the arrival at the point of greatest power, the time of greatest accomplishment.

The Detroit convention and exhibition of the American Foundrymen's association completes the first thirty years of useful and active service of that organization. Conceived of the yearning of foundrymen for greater knowledge of their art, born of the tireless striving of the pioneers of the nineties, nurtured with the kindly spirit of *give that ye may receive*, it has grown to the age which marks maturity in mankind. Here the comparison must end. The American Foundrymen's association sprang into useful activity with its earliest existence. Its powers have developed and its accomplishments have broadened with increasing years; and unlimited by the dimming perceptions which come to all mankind, the American Foundrymen's association will continue to grow, to serve and to advance with the industry.

Few can draw an accurate measure of the good which has been accomplished by this great organization. It might be said that the demand for castings for a wider range of service brought into being the advances which have marked the progress of the foundry industry. An enumeration of the uses to which castings were adapted thirty years ago, compared with the wider range of today would indicate the strides which have been taken. But who can say how much of this marked advance would have been possible without the study, work and free interchange of information which has been fostered by such agencies as the American Foundrymen's association. The advance has been gradual, perhaps too regular to be noted even by those most intimately concerned. The foundryman of 1896 probably could have produced the accurate, high quality work common today, but his methods would have been laborious and his production limited.

A study of the pages of THE FOUNDRY of 1896, when this paper was a lusty infant four years of age, shows that a crude type of molding machine was in use, which required that the flask be hand rammed, handled, lifted and rolled over by hand. Electric cranes were just recently introduced, but the hand jib and an undeveloped form of air hoist predominated. Sandblast tanks were making their first appearance, a single type of sand

Foundrymen who assembled in Philadelphia from throughout the country to form the American Foundrymen's association already knew each other through the pages of THE FOUNDRY

Crowns Apex Attainment

THE FOUNDRY

Vol. 7. DETROIT, MICH., JUNE, 1896. No. 48

THE AMERICAN FOUNDRYMEN'S ASSOCIATION!

Organized at Philadelphia June 12, 13 and 14.

MEETING A GRAND SUCCESS IN EVERY WAY

Those in Attendance were Enthusiastic concerning the Good Work Accomplished and Delighted with the Entertainment Received.

Philadelphia was the only city in which to hold the meeting that was to witness the formation of an American Foundrymen's Association.

This is not a "National Association," because that might carry with it the intimation that its membership was to be confined to the United States, while it is hoped that the large number of foundrymen, many of them prominent in their line and located in Canada, will be induced to join with us and make it what its name implies, thoroughly "American."

The same gentlemen who had been the pioneers in the original Philadelphia association, who had been its officers almost ever since, were on hand to welcome those attending, little realizing that these delegates were familiar with their names and their works and looked forward with the most pleasant anticipations to meeting those who had made such a gathering possible.

Long before the time for calling the meeting to order, in fact two days before, there commenced to arrive at the hotel headquarters and the Manufacturers' Club a few rep-

mixer was known and the foundries themselves were dimly lighted structures, evidently dirty and ill ventilated.

That manufacturers of foundry equipment have kept pace with the demands for greater production, uniformity, and high quality is appreciated, but an enumeration of types of foundry machines and devices, unknown at the birth of the American Foundrymen's association will indicate how far the industry has progressed in thirty years. In 1896, the following foundry equipment or supplies still were below the horizon: Sandblast tables or rooms; improved, uniform core binders; heat resisting refractories; flasks other than wood; numerous types of jar-ram, rollover, pattern-draw and sand throwing molding machines; complete core ovens made and equipped by the manufacturer; sand cutters and sand mixing machinery; sand conveying, hoisting and delivery devices; pneumatic chippers, rammers and miscellaneous tools; effective stand, swing type and portable grinding wheels; special abrasive sand and metal abrasives; wire and rod straighteners; tilting and internal combustion melting units; mold and casting conveyors; power riddles; special shakeout equipment; advance type compressors; multiple core machines; permanent mold equipment; core trucks and traveling racks; hand drawn and power type trucks and tractors; electric furnaces and ovens; cupola chargers; traveling cranes with grab buckets, lifting magnets; special pouring equipment. This list is not complete, but it serves to illuminate some of the steps in progress which have been made in thirty years.

Who can say how much less satisfactory the record might have been had each foundryman been forced to work out his problems unassisted? Would anyone venture the assertion that the foundry industry could have met its more varied problems as they were presented during the past thirty years, without the free interchange of ideas, the mutual help of the lessons taught by cumulative experience, given by each to others?

THE FOUNDRY with the inventors and perfectors of foundry equipment and materials and the American Foundrymen's association can accept a measure of credit for the thirty years of progress. It can accept such credit with justice and with a becoming measure of modesty, since much of the vision and achievement of this publication in bettering the foundry industry has been due to men who have gone before. THE FOUNDRY was inaugurated to meet the need of foundrymen for a publication which would represent the industry wholly and unselfishly, would supply the makers of castings with the technical information, news and comment so necessary to the growth and advancement of any individual, association, corporation, industry or people. Through its pages appeared the first expression of a need for organization among foundrymen. Its reports of the activities of the Philadelphia Foundrymen's association and other groups led to the crystallizing of sentiment which formed the American Foundrymen's association. This was not accomplished without overcoming much inertia and not a little opposition as is shown by the following quotation from the *Scrap Heap*, a paragraph form of editorial opinion from THE FOUNDRY of October, 1895:

> And now comes the movement for a National association, headed and championed naturally by those who first suggested the idea of foundrymen forming local associations, and just as naturally do we find a class of pessimists who want to know what good can be accomplished by putting the idea into immediate action.
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> * * * *
>
> These gentlemen are always in evidence. All reforms, improvements and advances made have to contend with more or less objection and criticism and no one should find

fault that it is so in this case. It will make the movement stronger and its members and officers more watchful that no opportunity is afforded those whose horizon is limited to a narrow boundary to cast any reflections.

Several things are sure in this connection. The first one is that few industries offer more opportunity for the improvement likely to result from discussing its methods. Second, few need it as badly, and that those who are willing, without possibility of reward, to give their time and the result of, perhaps, years of study to help in this much-needed movement are deserving of not only praise, but gratitude at the hands of every foundryman on earth.

* * *

THE FOUNDRY is willing to believe and say that those who have already done much in this way are capable of seeing it through to a finish; and more, that any foundryman who does not wish such a move toward prosperity ought to seek the advice of some competent physician without loss of time.

An effort was made through the co-operation of the Philadelphia Foundrymen's association with the Western Foundrymen's association to hold the first national gathering in the fall of 1895. This was unsuccessful, due to shortness of time, but a call was issued for the early summer of 1896. Howard Evans, then and to this day the secretary of the Philadelphia organization, and John A. Penton assembled a list of names of individual foundrymen to whom a call was sent to meet in the birthplace of American Independence on June 12 to 14, 1896.

The success of this, the first meeting of the American Foundrymen's association is told in THE FOUNDRY of June, 1896, the first page of which is reproduced on page 707 of this issue. This convention has become a part of recorded history. It would be a misstatement to infer that the association made an humble beginning. Its first meeting was successful. Its initial enrollment was 345. The first sessions were dignified, instructive and prophetic of the years which were to come. Its officers, drawn from throughout the United States and Canada were men of vision and perception. The work of the organization was clearly in mind at the start and advancement was blazoned from its banners unfurled for the first time in Philadelphia those summer days of 1896.

Many who attended the first session of the American Foundrymen's association will again be present in Detroit during the week of Sept. 25. They cannot but feel a thrill of satisfaction in this the society which they helped to launch. Their pride of accomplishment will be enhanced that the occasion marks the second International Foundrymen's Congress, the first international gathering to be held on American soil. The presence of the foreign guests who honor the American Foundrymen's association by their long journey to Detroit, the offering of papers bearing the European viewpoint on foundry subjects and the value of this further interchange of worldwide ideas represent a culmination of the vision which found voice in the Philadelphia meeting, thirty years ago. That man would be but a blind prophet who would fail to see a greater vista of service, a greater opportunity promised without fail by this greatest of all conventions of foundrymen.

Convention Timetable

Monday, September 27

1:30 p.m.—Opening meeting to be held at the Michigan State Fair grounds.
3:00 p.m.—Aluminum and aluminum alloys, materials handling and core binders and mixtures technical sessions.
4:00 to 6:00 p.m.—Receptional tea for ladies in Italian Garden room of Book-Cadillac hotel.

Tuesday, September 28

10:00 a.m.—Steel founding, nonferrous metals and apprentice training technical sessions.
10:00 a.m.—Ladies meet at Italian Garden room for trip through Book Tower, and automobile trip.
12:15 p.m.—Luncheon meeting and round table discussion of brass foundry problems.
12:30 p.m.—Luncheon for ladies at Detroit Golf club, and drive through suburbs.
2:00 p.m.—Symposium on permanent and long life molds, gray iron founding and foreign language (Franco-Belgian group) technical sessions.
6:30 p.m.—Foundry instructors' dinner and meeting, alumni dinner, Institute of Metals division, A. I. M. E.

Wednesday, September 29

10:00 a.m.—Steel foundry metallurgy, testing cast iron, malleable cast iron and Institute of Metals division of A. I. M. E. technical sessions.
10:00 a.m.—Ladies meet at Italian Garden room in Book-Cadillac hotel for drive to Belle Isle.
12:30 p. m.—Luncheon for ladies at Detroit Yacht club.
2:00 p.m.—Foundry costs, foundry refractories, and foreign language (German group) technical sessions.
8:15 p.m.—Band concert and vaudeville show at Masonic temple auditorium.
9:00 p.m.—Dance in Fountain room of Masonic temple.

Thursday, September 30

10:00 a.m.—Foundry sand control technical session.
12:15 p.m.—Luncheon and round table discussion of malleable foundry problems.
1:30 p.m.—Business meeting.
2:30 p.m.—Cast iron and elimination of waste in the foundry technical sessions.
6:30 p.m.—Annual banquet of American Foundrymen's association.

Friday, October 1

10:00 a.m.—Foundry sand control technical session.

Papers Cover Industry

INTERCHANGE of ideas and information is one of the strongest factors in the advancement of industry. Organization of the numerous firms and individuals connected with an industry into an association promotes the dissemination information and spurs these members to search still further into the mysteries of industry. The American Foundrymen's association is one of the greatest forces in the advancement of the foundry industry and each successive convention brings new evidence to support the fact.

Each branch of the foundry industry will be recognized in the technical program at Detroit. Twenty-four separate sessions including those to be held pointly with the Institute of Metals division of the American Institute of Mining and Metallurgical Engineers are scheduled to discuss papers and reports pertaining to shop and metallurgical developments of the steel, nonferrous, malleable cast iron and gray iron industries.

Foundrymen and metallurgists of international renown will present papers on behalf of the European foundrymen's associations. The Chesho-Slovakian Foundrymen's association will present a paper on nonferrous metallurgy contributed by Dr. V. Jares and one on malleable cast iron by Dr. O. Quadrat and J. Koritta. The Belgium association will present a paper on cast iron contributed by Ivan Lamoureaux. John Shaw will read a paper on gray iron on behalf of the Instutite of British Foundrymen. France will be represented by papers on cast iron by A. E. le Thomas and by A. Portevin and P. Chevenard. The German foundrymen will be represented by a paper on cast iron contributed by Dr. E. Piwowarsky, and Dr. W. Guertler will present a paper on brass at the meeting of the Institute of Metals division of the American Institute of Mining and Metallurgical Engineers.

In addition to these papers by foreign contemporaries there will be noteworthy contributions by outstanding foundrymen and metallurgists of our own country. Nonferrous problems will be discussed in three joint meetings of the American Foundrymen's association and the

(*Continued on Page* 711)

Tentative Program of Technical Papers

Monday, September 27

Aluminum and Aluminum Alloys—Joint Meeting with the Institute of Metals Division of the A. I. M. E.

Afternoon—Constitution of Aluminum-Zinc-Tin Alloys and Aluminum-Zinc-Cadmium Alloys, by Dr. V. Jares, Technical School, Prague. Paper of Czecho-Slovakian Foundry association.
Aluminum Alloy Permanent Mold Castings, by Robert J. Anderson, Cleveland.
Aluminum Castings of High Strength, by R. S. Archer and Zay Jeffries, Aluminum Co. of America, Cleveland.
Report of committee on nonferrous metals.

Materials Handling

Afternoon—Materials Handling in a Foundry, by E. T. Bennington, Cleveland Crane & Engineering Co., Wickliffe, O.
Saving Foundry Materials Handling, by H. J. Payne, Society for Electrical Development, New York.

Core Binders and Cores

Afternoon—A Standard Sand for Use in Testing Core Binders, by H. L. Campbell, University of Michigan, Ann Arbor, Mich.
Core Sand Mixture Tests, by C. A. Hansen, General Electric Co., Schenectady, N. Y.
Methods for Determining the Properties of Cores Made with Cereal Binders, by H. L. Campbell, University of Michigan, Ann Arbor, Mich.
Report of subcommittee on core testing of the joint committee on molding sand research.

Tuesday, September 28

Steel Founding

Morning—Defects in Steel Castings, by J. M. Sampson, General Electric Co., Schenectady, N. Y.
Defects in Steel Castings, by R. S. Munson, Atlantic Steel Castings Co., Chester, Pa.
Contribution by R. A. Bull, Electric Steel Founders' Research Group, Chicago.
Report of A. F. A. representatives on joint committee on investigation of phosphorus and sulphur in steel.

Symposium on Temperature Determination in the Nonferrous Foundry—Joint Meeting with the Institute of Metals Division of the A. I. M. E.

Morning—Symposium with discussions by A. A. Grubb, Ohio Brass Co., Mansfield, O.; H. M. St. John, Detroit Lubricator Co., Detroit; Kirtland Marsh, Aluminum Co. of America, New Kensington, Pa.; R. R. Clarke, General Electric Co., Erie, Pa.; representative, United States bureau of standards, Washington; A. S. Hall, Thwing Instrument Co., Philadelphia; R. D. Bean, Brown Instrument Co., Philadelphia.

Apprentice Training

Morning—Discussion of Apprentice Training.

Round Table Discussion on Brass Foundry Topics

Noon—Luncheon meeting and informal discussion.

Permanent and Long-Life Molds—A Symposium

Afternoon—Symposium with discussions by J. E. Hurst, Newton-Chambers & Co., Ltd., Sheffield, England; H. A. Schwartz, Cleveland; Leon Cammen, American Society of Mechanical Engineers, New York; S. M. Udale and H. P. Kimber, Holley Carburetor Co., Detroit; James A. Murphy, Hamilton, O.; Dr. Richard Moldenke, Wachtung, N. J.

Cupola Practice

Afternoon—Melting All Steel Heats in the Cupola, by T. F. Jennings, Utah Copper Co., Garfield, Utah.
A Study of Iron Melted in the Cupola, by R. E. Wendt and J. P. Walsted, Purdue University, Lafayette, Ind.
Chaplets in Heavy Iron Castings, by Ivan Lamoureaux, Liege, Belgium. Presented on behalf of the Association Technique de Fonderie de Liege.
A Study of Gating Iron Castings, by H. W. Dietert, United States Radiator Corp., Detroit.
Afternoon—Foreign Language session (Franco-Belgian).
Evening—Dinner and meeting of instructors of foundry practice in technical schools.

Wednesday, September 29

Steel Foundry Metallurgy

Morning—Open Hearth Slags, by W. C. Hamilton, American Steel Foundries, Granite City, Ill.
Manganese in Carbon Steel Castings, by John Howe Hall, Taylor-Wharton Iron & Steel Co., High Bridge, N. J.
Report of Committee on steel castings.

Testing Cast Iron

Morning—A Shearing Test for Cast Iron, by G. K. Elliott, Lunkenheimer Co., Cincinnati.
The Strength of Cast Iron in Relation to Its Thickness, by W. H. Rother and M. V. Mazurie, Buffalo Foundry & Machine Co., Buffalo.
Some Gray Iron Problems, by John Shaw, Brightside Foundry & Engineering Co., Sheffield, England. Exchange paper of the Institute of British Foundrymen.
New Methods of Testing Cast Iron in Daily Practice, by A. E. le Thomas, Paris, France. Exchange paper of the French Foundry Technical association.

Malleable Cast Iron

Morning—Some Controversial Matters Pertaining to Malleable Iron Castings, by Enrique Touceda, Albany, N. Y.
What May Be Required of Malleable Cast Iron, by H. A. Schwartz, National Malleable & Steel Casting Co., Cleveland.
A Study of Malleable Cast Iron, by Dr. O. Quadrat and J. Koritta, University of Prague, Checho-Slovakia. A contribution from the Checho-Slovakian Foundry association.
Report of the committee on malleable cast iron.

Special Session of the Institute of Metals Division of the A. I. M. E.

Morning—The Utility of Nickel-Manganese and Iron Alloys in Making Special Brasses, by Dr. W. Guertler, Technical High School, Charlottenburg, Germany. Presented in behalf of the Deutsche Gesellschaft fur Metallkunde.
Exudation on Brass and Bronze, by W. B. Price and A. J. Phillips, Scovill Mfg. Co, Waterbury, Conn.

Foundry Costs

Afternoon—Discussion of general needs for foundry cost methods and exposition of a specific foundry cost system for practical use.
Report of the committee on foundry costs.
Costs, by E. W. McCullough, manager, department of manufacture, United States chamber of commerce, Washington.
Costs, by R. E. Belt, American Malleable Castings association, Cleveland.

Foundry Refractories

Afternoon—Report of the chairman of the joint committee on foundry refractories.
Report of subcommittee on service in (a) Steel foundries; (b) Malleable foundries; (c) Cast iron Foundries; (d) Nonferrous foundries.
Report of subcommittee on testing and specifications.
Report of subcommittee on standardization and simplification.
Discussion of foundry refractories.
Afternoon—Foreign language session (German).

Thursday, September 30

Foundry Sand Control

Morning—Reports of subcommittees of joint committee on molding sand research.
Discussion of methods for practical shop control of foundry sand conditions.
Some Practical and Technical Data Obtained from the Use of Clay Additions to Molding Sand Heaps, by R. F. Harrington, A. S. Wright and M. A. Hosmer, Hunt-Spiller Mfg. Corp., Boston. A contribution on behalf of the New England Foundrymen's association.
Strength Testing of Foundry Sands, by T. C. Adams, Cornell University, Ithaca, N. Y.
Tests To Show Proper Mixing of Foundry Sands, by H. W. Dietert, United States Radiator Corp., Detroit.
Noon—Luncheon meeting and informal discussion of practical malleable foundry topics.
Afternoon—Business meeting.

Cast Iron Session

Afternoon—The Dilatometric Analysis of Iron, by A. Portevin and P. Chevenard, Paris, France. Exchange paper of the French Foundry association.
Heat Resistant Cast Irons, by Oliver Smalley, New York.
Phosphorus in Cast Iron, by J. T. MacKenzie, American Cast Iron Pipe Co., Birmingham, Ala.
Production of High Grade Foundry Iron, by Dr. E. Piwowarsky, Technical High School, Aachen, Germany. Presented on behalf of the Verein Deutscher Eisengiessereien.
The Effect of Various Alloys on the Growth of Gray Iron Under Repeated Heatings and Coolings, by R. R. Kennedy and G. J. Oswald, National Cash Register Co., Dayton, O.
Afternoon—Discussion of possibilities of elimination of waste.
Report of committee on pattern equipment standardization.
Report of committee on corrosion of metals.

Friday, October 1

Foundry Sand Control

Morning—Metallurgical Control of Foundry Sands, by L. B. Thomas, Fairbanks, Morse Co., Three Rivers, Mich.
Grading Molding Sands, by C. A. Hansen, General Electric Co., Schenectady, N. Y.
The Effect of Mulling Time on Some of the Properties of Sand, by A. V. Leun, Cornell University, Ithaca, N. Y.
Some Experiments To Determine the Effect of Clay on the Fusion Point of Molding Sands, by D. W. Trainer, Cornell University, Ithaca, N. Y.

Representative Foundries in the Convention City

Location, Personnel and Capacity of Casting Plants in Detroit

Name	Address	Established	Metal melted	Class of Casting	Output Daily Tons	Melting Units	Men Employed	President or General Manager
Acme Foundry Co.	2503 Isabella Ave.	1903	Gray iron	Jobbing	30	1 cupola	85	E. H. Jones
Alloys Foundry Co.	192 Mt. Elliott Ave.	1925	Bronze and aluminum	Jobbing	1	3 pit, 1 electric	20	L. Duncan
American Brass & Iron Co.	6425 Crystal Ave.	1905	Copper, tin, lead, zinc.	Red and yellow brass	2	8 coke furnaces, No. 70 crucibles	10	L. K. Douglars
American Car & Foundry Co.	5718 Russell Ave.	1880	Gray iron and semi-steel	Railroad, jobbing, automobile	200	4 cupolas	300	E. J. Hall
American Injector Co.	1469 14th Ave	1883	Brass and aluminum	Railroad injectors grease cups, etc.	3	6 coke fired furnaces	15	John Trix
American Lubricator Co.	Summit Ave. and Wabash Ry.	1901	Brass	Light jobbing	2	Coke, oil and gas	20	Homer D. Cobman
American Radiator Co.	1558 Trombley Ave.	1886	Gray iron	Cast iron boilers and water heaters	85	1—102" cupola	160	R. H. Mann
Apex Foundry Co.	170 Mt. Elliott Ave.	1923	Gray iron	Jobbing	8	1 cupola	35	F. S. Ferguson
Atlas Foundry Co.	1331 So. Artillery Ave.	1910	Gray iron	Automobile	40	3 cupolas	400	Robert Crawford
Banner Brass Works	444 So. Campbell Ave.	1926	Brass, bronze & alum.	Jobbing and Pro.	1-1½	3 coke pit furnaces	5	R. G. John
Barton Brass Co.	3625 Superior Ave.	1920	Alum., brass, bronze	Lighting fixtures	2	3 oil furnaces	7	H. J. Barton
Bohn Aluminum & Brass Corp.	2512 E. Grand Blvd.	1924	Brass and aluminum	Aluminum sand castings, etc.	125		800	Charles B. Bohn
Brabant Brass Mfg. Co.	8925 Knox St.	1920	Brass	Cocks	4	10 pit furnaces	10	Leo B. Brabant
Brass Products Co.	3661 Palmer Ave.	1910	Brass	Auto jobbing		7 pit	50	W. H. Gehring
Buhl Malleable Iron Co.	3290 Wight Ave.	1899	Pig iron and scrap	Malleable iron and open hearth steel	21 (open hearth) 70 (Mal. iron)	4 air, 1—7-ton O. H. Steel	400	P. J. McManus
Cadillac Brass & Mfg. Co.	4734 Bellevue Ave.	1920	Brass	Small solid cored work	1	coke pits	7	W. C. Quellette
Cadillac Motor Car Co.	2860 Clark Ave.	1902	Gray iron, brass and alum.	Automobile	75 (iron) 25 (alum.) 15 (brass)	3 cupolas, 5 electric furnaces, 21 oil furnaces	600	Lawrence P. Fisher
Capital Brass Works	2306 Franklin Ave.	1898	Nonferrous metals	Hardware and auto.	20	28 oil pit fires	125	Benjamin Noble
R. B. Carolin	3633 Military Ave.	1912	Nonferrous metals	Jobbing	3	6 coke furnaces, 2 gas furnaces	35 to 50	R. B. Carolin
Central Specialty Co.	7529 St. Aubin Ave.	1911	Gray iron	Piston rings and hardware	35	2 cupolas	65	G. J. Zimmerman
City Brass Foundry Co.	1979 Macomb St.	1913	All kinds	Jobbing	1	6 crucible, 1 alum. furnace	10	Fred L. Maeder
City Pattern Works	Harper Ave. and Rivard	1913	Bronze, brass and aluminum	Adding machine, Refrigerator etc.	2½	8 oil furnaces	22	Vaughan Reid
Columbia Castings Co.	111 South Ferdinand Ave.	1912	Alum., brass and bronze	Automobile	20	20 pit	200	E. L. Nelson
Commerce Pattern Foundry & Machine Co.	2211 Grand River Ave.	1922	Brass, alum. and manganese	Experimental and production	6	1 electric, 5 oil	15	E. J. Rousseau
Commonwealth Brass Corp.	5781 Commonwealth Ave.	1906	Brass	Valves, etc.	10	22 crucible furnaces	60	N. A. Henwood
Cope-Swift Co.	247 MacDougall Ave.	1891	Gray iron, brass and alum.	General Jobbing	6	1 cupola, 6 coke fired fur.	35	Clarence B. Swift
Detroit Aluminum & Brass Corp.	3975 Christopher	1925	Aluminum and brass	Automobile parts	25	Oil furnaces, electric furnaces	200	Lloyd G. Hooker
Detroit Brass & Malleable Works	1177 Holden Ave.	1893	Brass and malleable	Valves, cocks and malleable				
Detroit Gray Iron Foundry Co.	Foot of Iron St.	1916	Gray iron	Jobbing	100	2 cupolas	175	Hugh Martin
Detroit Lubricator Co.	5842 Trumbull Ave.	1876	Brass	Lubricator	35	3 electric, 28 pits	250	C. H. Hodges
Detroit Michigan Stove Co.	6900 E. Jefferson St.	1867	Pig Iron	Stove Plates	90	3 cupolas	300	John A. Fry
Detroit Pattern Plate Co.	Epworth Blvd.	1918	Aluminum and brass	Pattern and alum. match plates and special castings		3 coke furnaces	6	L. E. Gregory
Detroit Sanitary Supply Co.	5905 Second Ave.	1889	Nonferrous-brass and lead	Plumbing Goods	1	8 pit furnaces, coke fired	14	A. J. Springborn
Detroit Steel Casting Co.	4069 Michigan	1902	Cast steel	Jobbing	50	2 open hearth furnaces 1 electric furnace	400	S. W. Utley
Detroit Torch & Mfg. Co.	12057 Cardoni Ave.	1917	Brass	Jobbing	2	7 coke furnaces	25	E. J. Horn
Dodge Bros, Inc.	7900 Jos. Campau Ave.	1914	Brass and aluminum Gray iron and semi steel	Automobile parts	500 (B) 18 (A) 6	13 furnaces, 4 cupolas	530	E. G. Wilmer
Douglas & Lomason Co.	5836 Lincoln Ave.	1902	Aluminum and brass	Light and medium	...	8 coke crucible furnaces	8	A. G. Douglas
Eastern Foundry Co.	520 Orleans St.	1922	Aluminum, brass and bronze castings	Alum. brass and bronze	2	6 brass furnaces, 2 gas furnaces		Wm. H. Schoewe
Enterprise Foundry Co.	6463 E. Warren	1875	Pig iron, aluminum	Light gray, light hvy.	12	2 cupolas	75	Chas. W. Carolin
Essex Brass Corp.	2000 Franklin St.	1901	Brass	Small	2	6 open pit furnaces	12	E. C. Nagel
Eureka Vacuum Cleaner Co.	Dewey and Hamilton	1924	Aluminum	Semi-permanent Mold	2	5 tilting	60	E. R. Field
Federal-Mogul Corp.	10034 Shoemaker	...	Bronzes	Bushings and backs for babbitt lined bearings, cored bars	15	5 electric furnaces	70	Lloyd P. Jones
Fernstedt Mfg. Co.	6307 W. Fort St.	1920	Brass	Auto hardware	..	4 pit furnaces	20	P. W. Seiler
Ford Motor Co.	Fordson	1920	Cast iron and steel	Automotive and job castings	2500	37 cupolas	8,500	
Grant Bros. Foundry Co.	2931 Beaufait Ave.	1910	Iron	Jobbing	16	1 cupola	50	Vital Quellette
Great Lakes Engineering Wks.	Foot of Rivard (River Rouge)	...	Gray iron	Marine and heavy machinery	25	Cupola	75	J. A. Ubsdell
Griffin Wheel Co.	2270 Beecher Ave.	1877	Cast iron	Chilled iron car wheels	160	1 cupola	90	F. L. Whitcomb
Hackett Brass Foundry	1202 Lillibridge St.	1918	Non ferrous metals	Any kind	3	6 pit furnaces	15	H. Kirazian
A. Harvey's Sons Mfg Co.	First & Woodbridge	1855	Gray iron	Machinery	7	1 cupola	30	C. F. Harvey
Holley Carburetor	Vancouver & P. M. R. R.	1921	Gray iron	Carburetors & engine parts	35	1 cupola	90	D. W. Candler

Representative Foundries in the Convention City (Concluded)

Location, Personnel and Capacity of Casting Plants in Detroit

Name	Address	Established	Metal melted	Class of Casting	Output Daily Tons	Melting Units	Men Employed	President or General Manager
Ideal Furnace Co.	W. Grand Blvd.	1903	Cast		40		150	B. H. Edwards
Johnston & Jennings Co.	104 North Solvay Ave.	1926	Hard iron	Sashweights, etc.	40	1 cupola	50	
Frederick Kahl Iron Foundry	2111 E. Atwater St.	1886	Cast iron	Jobbing	15 to 20	1 cupola	50	C. N. White
Kelsey Wheel Co.	6100 McGraw Ave.	1919	Gray iron	Wheels and auto	60	2 cupolas	300	Gordon Park
Kendrick Mfg. Co.	2724 Franklin	1907	Brass and bronze	All kinds	11	28 crucible pit furnaces	43	Horace Kendrick
LeRoy-Broehm Foundry Co.	3126 Jefferson Ave.	1920	Red brass	Carburetor	2	4 crucible furnaces	24	Frank Le Roy
Lincoln Brass Works	2067 Twelfth St.	1916	Brass ingots and copper	Yellow Brass	2½	9 coke furnaces	13	B. Ellison
Long Mfg. Co.	2768 E. Grand Blvd.	1906	Copper and brass	Light copper & brass	2	6 coke furnaces	10	J. L. Dryden
Lukomski Bros.	2480 East Grand Blvd.	1914	Gray iron	Jobbing	5	1 cupola	6	John Lukomski
Magnus Co., Inc.	3501 Griffin Ave.	1852	Brass and bronze	For railroads	25	7 oil fired	40	A. J. Skiffington
McCoy Bronze Co.	Forsyth and Holden	1920	Bronze and aluminum	Architectural				Robt. Hubbert
McRae & Roberts Co.	100 Campbell Ave.	1888	All kinds Cu. alloys	For air, water, steam, etc.	10	4 electric	60	W. S. Killam
Michigan Alkali Co.	1622 Ford Bldg.	1900	Gray iron	Machinery	25	2 cupolas	160	William T. Orr
Michigan Lubricator Co.	3643 Beaubien St.	1883	Brass	Production - plated & gated	40	2 electric, 3 simplex 1 tilting	30	E. C. Johnston
Michigan Malleable Iron Co.	7740 Gould Ave.	1881	Malleable iron	Automobile castings	100	8 air furnaces	200	A. F. Jackson
Michigan Steel Castings Co.	St. Aubin at Atwater	1907	Steel	Small steel castings alloy castings	20	2 furnaces	230	R. F. Flintermann
Michigan Valve & Foundry Co.	3631 Parkinson St.	1852	Gray iron, brass, manganese bronze, aluminum		60	2 cupolas, crucibles	130	Wm. H. Carrathers
Motor & Machinery Castings Co.	W. Davison & D. T. R R	1923	Gray iron	Jobbing	25	1 cupola	60	J. H. Barron
Nagel-Wallace Brass Works	2928—25th St.	1908	Brass, bronze and aluminum	Jobbing	300	2 coke fired furnaces	2	W. C. Nagel
National Alloys Co.	2120 E. Woodbridge St.	1921	Nonferrous	Special Alloys and Permanent mold castings	5	14 crucible	12	
National Bronze & Aluminum Castings Co.	3530 Garfield	1915	Brass, bronze and aluminum	Bushings and bearings	10	12 oil fired tilting	32	P. J. Donnelly
Nelson Foundry Co.	1984 West Lafayette	1917	Brass, bronze and aluminum	Ornamental	300	4 crucibles	5	N. Wohlgehagen
Packard Motor Car Co.	1580 E. Grand Blvd.	....	Iron, bronze and aluminum	Automobile	(I) 100 (B) 4 (A) 12	4 cupola, 2 open flame, 2 tilting, 3 oscil., 3 pit	633 2	Alvan Macauley
Park & McKay Co.	237 Bagley Ave.	1880	Brass	Plumbing fixtures	½	3 crucible furnaces	5	C. L. Pease
Penberthy Injector Co.	1242 Holden Ave.	1886	Brass and bronze oil burners	Injectors, ejectors, oil	35	5 pit, 2 electric	370	Clarence L. Lamson
Peninsular Stove Co.	W. Fort and Eighth Sts.	1879	Gray iron	Stove and furnace	80	4 cupolas	175	Fred T. Moran
Riley Stoker Co.	Foot of Walker St.	1878	Gray iron	Stoker and jobbing	55	2 cupolas	200	William V. McAllister
Roberts Brass Mfg. Co.	5435 W. Fort St.	1905	Brass	Plumbing—Auto	20	40 pit fired crucibles	170	W. H. Roberts
C. E. Rogers	8731 Witt St.	1915	Brass and nickel alloys	Heavy	1½	2 oil, 3 coke	3	
Sherwood Brass Works	6331 E. Jefferson Ave.	1903	Red brass, yellow phosphor and manganese bronze, aluminum	Any kind	30	Oil fired pit, electric	40	Wm. Sherwood
Schmandt Foundry Co.	6401 Miller Ave.	1922 nickel	Brass, bronze and aluminum, alloy	Jobbing	4–5	7 oil, 1 aluminum	40	John B. Schmandt
Schwarz Foundry Co.	2001 W. Fort	1906	Pig iron, etc.	Gray iron	5	1 cupola	20	Frank L. Schwarz, Jr.
Scott Valve Mfg. Co.	3962 McKinley St.	1886	Bronze	Valve castings	3½	open flame, 1 pit	18	F. P. Thomas
Standard Peninsular Brass Works	W. Warren & Walton	1887	Brass	Stove, auto	5	4 electric	30	P. E. Walton
Stuart Foundry Co.	138 So. Junction Ave.	1880	Gray iron and semi-steel	Mach. die, jig and fixture castings, manhole covers, inlets, pool grates	30	2 cupolas	65	L. J. Maroska
Superior Brass Works, Inc.	312 So. Crawford St.	1918	Brass	Rough brass and finished castings	10	16 coke fires, 3 furnaces	25	J. M. Burke
Swedish Crucible Steel Co.	8745 Conant Road	1910	Steel	Jobbing	30	7 crucible, 2 converter	150	N. L. Olson
U. S. Aluminum Co.	3311 Dunn Road	....	Aluminum alloys	Automobile, aircraft, etc.	25	oil	400	
U. S. Radiator Corp.	133 E. Grand River Ave.	1910	Cast iron	Boilers and radiators	90–100	1 cupola	225	H. T. Cole
Whitehead & Kales Co.	56 Haltner St. (River Rouge)	1903	Cast iron	Wheels and auto	110	2 cupolas	205	James T. Warner
Williams Foundry Co.	1161 Bellvue Ave.	....	Aluminum	Jobbing	1	3 pit furnaces	5	Joe Williams
Wolverine Foundry Co.	1161 Bellevue Ave.	1905	Gray Iron	Plumbers specialties	3	1 coke fired cupola	18	John H. Wilkie

(*Continued from Page* 708)

Institute of Metals division and one special session of the Institute of Metals. In addition to these meetings following the custom set at the Syracuse convention in 1925, a luncheon and informal discussion of brass foundry topics will be held.

Malleable cast iron founders will hear papers by Enrique Touceda and H. A. Schwartz who have been in the vanguard in the advancement of the malleable industry. European studies will be presented in a paper by Dr. O. Quadrat and J. Koritta of Checho-Slovakia. In addition to the regular technical sessions a luncheon and informal discussion of practical every-day malleable questions will be held.

Two sessions have been set apart for papers on steel foundry metallurgy and shop practice. W. C. Hamilton will contribute a paper on open hearth slags, John Howe Hall will present a paper on manganese in steel castings and the defects in steel castings will be dealt with in

papers by J. M. Sampson and R. S. Munson. R. A. Bull also will contribute a paper on steel founding.

Cast iron comes in for a goodly share of the papers presented. Prominent metallurgists of this and European countries have contributed papers that comprise the most valuable articles on this subject which ever have been presented at any one meeting. Papers by J. T. MacKenzie, Oliver Smalley, A. Portevin and P. Chevenard, Dr. E. Piwowarsky, G. K. Elliott, John Shaw, A. E. le Thomas and others of prominence will deal with the metallurgical and physical features of cast iron. The practical side of the gray iron foundry will not be neglected and the practical foundryman will find much to interest him in topics, such as Melting All Steel Heats in the Cupola, by T. F. Jennings. R. E. Wendt and J. P. Walsted will present a paper on iron melted in the cupola. The gating of castings is more or less of a problem as it may constitute a good or bad casting, and some of the difficulties encountered may be solved in a paper on this subject by H. W. Dietert. Ivan Lamoureaux, Belgium, will present a paper on chaplets in heavy castings, and describe the European methods now practiced.

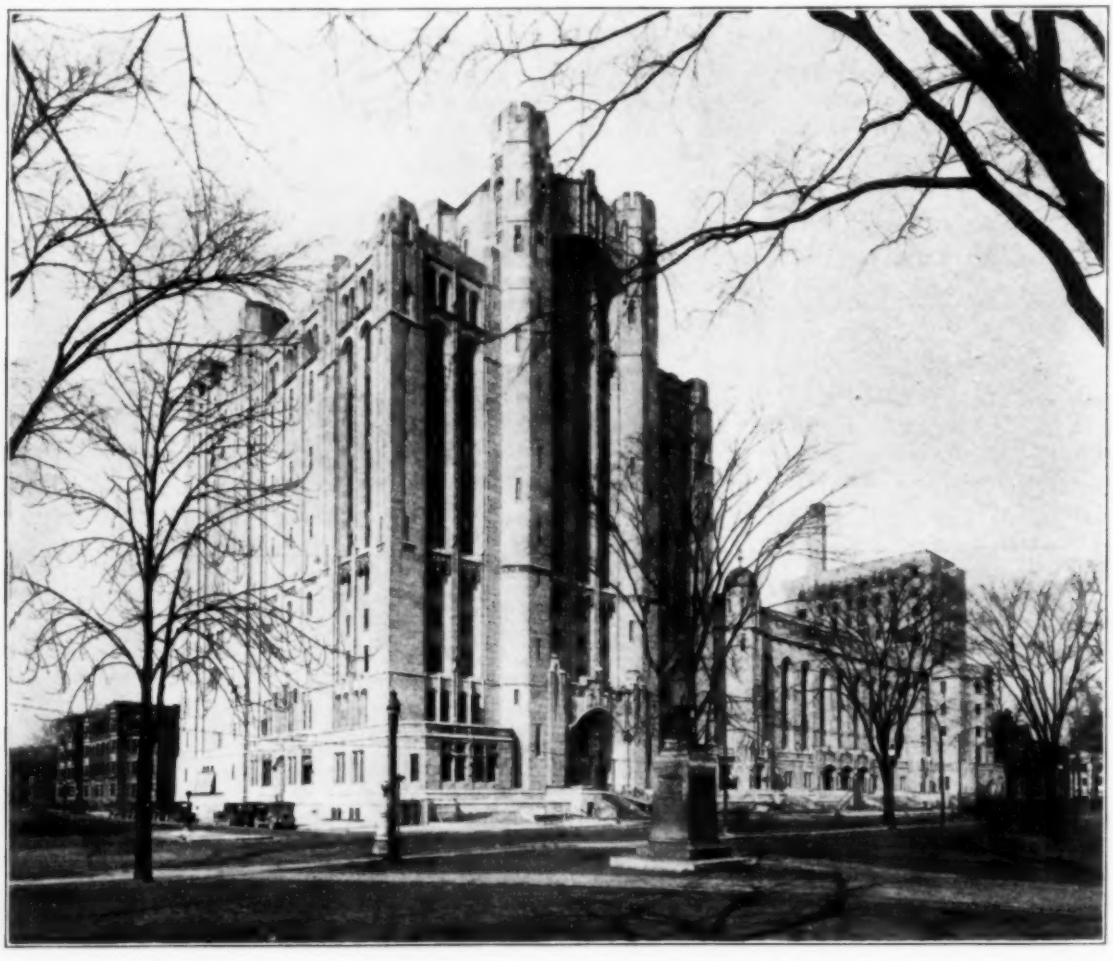
Permanent and long life molds will be discussed by authorities here and in Europe such as J. E. Hurst, Sheffield, England; H. A. Schwartz, Cleveland; Leon Cammen, New York; S. M. Udale and H. P. Kimber, Detroit; James A. Murphy, Hamilton, O., and Dr. Richard Moldenke, Wachtung, N. J. Recent developments in this field have received much attention and in time probably all foundries on repetition production work will employ some such means as permanent or long life molds.

Costs Paramount

Keen competition in the foundry industry has shown the foundryman the value of an accurate system of cost accounting. Failure to maintain a cost system has forced more than one out of business. R. A. Belt, American Malleable Cast Iron association will talk on the fundamentals of foundry cost records and E. W. McCullough, United States chamber of commerce will explain the progress which is being made in the development of cost keeping in various industries.

Foundry sand control is a subject that will appeal to many foundrymen. Two sessions will be devoted to discussing methods for practical shop control and the presentation of papers that bear on the testing and proper mixing of foundry sands. The effect of clay additions also will be shown in two papers as will the grading of molding sands, and the effect of mulling time on sand properties.

Sessions on core binders, materials handling and foundry refractories should prove of interest to all groups of foundrymen. The work of the recently organized joint committee on foundry refractories will be explained and the results of surveys of the refractories' problems of the various branches of the industry will be discussed. Modern methods of handling foundry materials will be presented in two papers and core binders and methods of testing them and cores will be discussed in the session on that subject.



The Detroit Committee Has Arranged for a Band Concert, Vaudeville Show and Dance at the New Masonic Temple on Wednesday Evening, Sept. 29.

Detroit Offers Hospitality

COMMITTEES composed of the men and women prominent in the foundry industry in Detroit and the surrounding territory have arranged an ambitious program for the entertainment of the visitors in their city during the convention week. Sightseeing trips to many of the beautiful spots in and around Detroit, luncheons, and shopping trips are planned for the ladies and a special party is

being arranged for all convention visitors on Wednesday evening.

For the first time in the history of the association, the ladies will have separate registration headquarters. All women attending the convention are expected to register immediately upon arrival at the woman's headquarters which will be located in the Italian Garden room of the Book-Cadillac hotel. A special information bureau will be maintained at the headquarters where information on the city may be secured and shopping guides obtained.

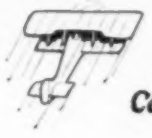
A reception and tea will be given by the ladies entertainment committee in the Italian Garden room of the Book-Cadillac hotel Monday afternoon, Sept. 27, from four to six, to give the ladies an opportunity to become acquainted. Wives of the foreign visitors of the American Foundrymen's association and the wives of the officers of the association will be the guests of honor.

The ladies will meet at ten o'clock on Tuesday morning at the woman's headquarters and will be taken to the new 40-story Book tower where they will be given a bird's-eye view of the city. After the trip through the tower the ladies will be taken by automobile to the Detroit Golf club where luncheon will be served. After luncheon, the visitors will be taken on a delightful drive through the lake region of Oakland county and Bloomfield Hills to the beautiful estate of George G. Booth. The party will return to the hotel by way of Woodward avenue.

On Wednesday, Sept. 29, the ladies again will meet at the Italian Garden room in the Book-Cadillac hotel at ten o'clock and will be taken out Jefferson avenue to Grosse Point. The party will return to Belle Isle and will have luncheon at the Detroit Boat club or the Detroit Yacht club. After luncheon a drive will be taken around Belle Isle, the playground of Detroit, and back to the city. On the return trip the party will stop at the beautiful public library located on Woodward avenue. Special arrangements may be made for visiting other points of interest in Detroit by applying at the information bureau at the woman's headquarters. The Woman's City club of Detroit is extending the privileges of the club to the out of town registered guests for the period of the convention.

One of the big features of the entertainment program for the week will be the band concert, vaudeville show and dance which will be held in the Masonic temple, Wednesday night. The band concert, which will be given in the large auditorium of the recently completed building by Dodge Bros. band, will start at 8:15. This band is composed of a splendid group of musicians and is recognized as one of the leading industrial bands in the country. After the concert, which will last in the neighborhood of one hour, various vaudeville performers from the local theaters will continue with the entertainment.

The dance will start at 9 p. m. in the Fountain room of the temple, which is on the floor below the auditorium. Music will be supplied by two prominent Detroit orchestras, namely the Jean Goldkette orchestra, which broadcasts from WCX and the Jules Klein orchestra which broadcasts through WWJ.



Detroit Convention Daily

All
For You
Each Day
At Detroit
A Daily Paper
Full of the News
Of the Convention
Get Your Free Copy!

A COMPLETE daily paper, filled with news and pictures of the big convention will be published by THE FOUNDRY, *Monday, Tuesday, Wednesday and Thursday, Sept. 27 to 30. Each day's events will be flashed to Cleveland by wire. There the big presses will be waiting to start printing each night and the editions will be rushed to Detroit before breakfast the following morning. The paper will be given free to visitors and may be obtained at the American Foundrymen's association registration booth or the exhibition space of* THE FOUNDRY *Booths 41-54 Agricultural building.*

Delegates Progress

ON MONDAY, Sept. 20, over 100 visitors from various European countries will disembark from the steamers LANCASTRIA and DEUTSCHLAND at New York. After landing, the members of the delegation will transfer to the Hotel Pennsylvania where, if time permits, an informal reception will be held. On arrival all guests will register with representatives of the American Foundrymen's association.

Certain foundries and manufacturing plants in the vicinity of New York will be inspected on Tuesday, and at 7. p. m. all members of the delegation and their ladies will attend a dinner of welcome given by the American Foundrymen's association. A. B. Root Jr., president, Hunt Spiller Mfg. Corp., Boston, and John A. Penton, Penton Publishing Co., Cleveland, honorary member of the association, will give the addresses of welcome.

At 9 a. m., Wednesday, the party will board special parlor cars on the Pennsylvania railroad and arrive in Philadelphia at 11 a. m. An informal reception will be held at Hotel Benjamin Franklin. A visit will be made to the Sesquicentennial exposition at 2 p. m. Admission tickets and transportation to the exposition, but not returning, will be provided by the Philadelphia committee. At 7:30 p. m. a dinner will be tendered the members of the delegation and their ladies at the Manufacturers club. On Thursday the gentlemen will leave at 9:30 a. m. for plant visitation, and the ladies will go on a sightseeing tour at 10 a. m.

Leaving Philadelphia at 9:20 a. m. Friday the delegation will travel over the Lehigh Valley railroad and arrive in Buffalo at 7:55 p. m. where an informal reception will be held at

(*Concluded on Page* 749)

Exhibits Forecast Greater Progress

RAPID strides in the application of mechanical methods to the foundry industry have been assisted greatly in recent years by the interest on the part of both foundrymen and equipment manufacturers in the exhibits of equipment and supplies which are held annually under the direction of the American Foundrymen's association during the convention of that organization.

That the Detroit show will outdistance any of the previous exhibitions of foundry equipment seems assured, since in the neighborhood of 100,000 square feet of floor space will be used and a larger number of companies will exhibit than ever before. Reports from exhibitors indicate that considerable new equipment will be shown for the first time, that many of the displays will be in operation and that iron will be melted and poured in one of the exhibition halls.

International interest in this exhibit will be intensified by the attendance of a large delegation of foreign foundrymen and by the several European companies represented with exhibits.

Floor plans and lists of exhibitors, a description of the exhibits and lists of the company representatives follow.

A

ABRASIVE INDUSTRY, Cleveland — The booth of this company will be fitted up as a rest room where those in attendance at the convention are invited to make their headquarters. The representatives will be J. D. Pease, J. F. Ahrens, G. B. Howarth, S. H. Jasper, L. G. Pelott, V. E. Dolan, H. Cole Estep, Frank G. Stedtfeldt and Edwin Bremer.

ADAMS CO., Dubuque, Ia.—This company will show two jolt squeezer molding machines, a pneumatic sand riddle, snap flasks, steel jackets and miscellaneous equipment. The representatives will be L. A. Demkiet and W. J. Spensley.

ADVANCE MILLING CO., Chicago—Samples of core binders manufactured by this company as well as cores made using this product will be shown.

AGNEW ELECTRIC WELDER, INC., Milford, Mich. This company will show electric welding equipment and supplies.

AIR REDUCTION SALES CO., New York —Cylinders of oxygen and acetylene and welding and cutting apparatus and supplies will constitute the exhibit of this company. Demonstrations also will be made of cutting steel risers and welding castings with oxyacetylene. Representatives will be G. Van Alstyne, J. L. King, F. Bowers, and L. P. Naylor.

AJAX ELECTROTHERMIC CORP., Trenton, N. J.—This company will exhibit a new model of a high frequency furnace, a 636 pound high frequency induction furnace for melting nickel-silver and other metals, a small base receptacle furnace for laboratory work and a portable box furnace for the same purpose. The representatives will be G. H. Clamer, E. F. Northrup and Dudley Willcox.

AJAX METAL CO., Philadelphia—Brass, bronze and other nonferrous alloys in ingot form will be exhibited by this company. The company will be represented by G. H. Clamer, W. J. Coane, F. M. Willcson, Zeno D. Barnes, Henry Gieseke, William Adams and Dudley Willcox.

ALBANY SAND & SUPPLY CO., Albany, N. Y.—The display of this company will consist of a large number of samples of its line of molding sand. The booth also will be fitted up as a rest room.

ALLEN AIR-TURBINE VENTILATOR CO., Detroit—A line of exhausting equipment will be shown by this company which will include equipment produced in copper and the standard in regular finish. The representatives will be L. P. Halleck, Hugh T. Wreaks, and Perry F. Kimball.

ALLOYS & PRODUCTS CO., INC., New York—A large number of alloys used in brass foundry practice will be shown by this company.

AMERICAN BRAKE SHOE & FOUNDRY CO., Chicago—Special open and bottom annealing pots will be shown by this company. The representatives will be C. P. Wright, W. S. Cumming and R. S. Stewart.

AMERICAN EECTRIC MOTORS, INC., Milwaukee—Heavy duty grinding stands, polishing stands and enclosed self ventilating ball bearing induction motors will be demonstrated at the booth of this company. The representatives will be Deane S. Holt, A. A. Hess, L. A. Humason, and Walter H. Fenslau.

AMERICAN ENGINEERING CO., Philadelphia—A 1-ton hoist with plain trolley, a 2-ton hoist equipped with alternating current foundry control and with a hand geared trolley and a 2-ton hoist equipped with direct current control and motor trolley will be shown handling flasks and other foundry equipment. In addition a 3-ton hoist will be exhibited with covers removed to show the gearing and the construction. The company will be represented by H. Kemper, and A. E. Martell.

AMERICAN FOUNDRY EQUIPMENT CO., INC., Mishawaka, Ind.—This company will show an automatic rotary table in operation, blast room, a sand blast barrel and a sand blast pressure tank outfit, cloth screen type dust arresters and four styles of sand cutting machines. A new core machine and a number of aluminum taper strip flasks also will be shown. The company will be represented by Verne E. Minich, Fred Graf, Hutton H. Haley, C. D. Steinmeier, F. A. Smith, L. D. Peik, Harry R. Behnke, J. D. Alexander, J. E. Sweet, E. J. Turnbull, James Rigby Jr., Charles L. Benham, David Logan, and Charles Roses.

AMERICAN STEEL & ABRASIVE CO., Calion, O.—Steel abrasives for the foundry cleaning room will be on display at the booth of this company.

AMERICAN VENT WAX CO., Lockport, N. Y.—Spools of the various sizes of vent

wax used for venting cores will be displayed by this company. Nelson L. Nankey and Chas. J. Seibold will represent the company.

AMES SHOVEL & TOOL CO., Boston—Numerous types of molder shovels and scoops will be on display at the booth of this company.

ARCADE MFG. CO., Freeport, Ill.—This company will show a hand operated, power squeeze and a jolt squeeze type molding machine. The squeezer line will consist of one operated by air, a combination jolt, and a straddle type. Several of the machines will be in operation, as will be equipment for making piston castings in green sand. The booth will be in charge of L. L. Munn, B. C. Trueblood, Henry Tscherning, Mentor Wheat, August Christen, R. E. Turnbull, G. D. Wolfley, Herman Kasten, Carl Falk, and V. S. Firestone.

ASBURY GRAPHITE MILLS, Asbury, N. J.—This company will exhibit samples of crude and refined plumbago and graphite and will demonstrate the different grades of foundry facing. A collection of pictures showing the mining and refining of plumbago also will be shown. The booth will be in charge of H. M. Riddle Jr., Jonathan Bartley and Walter Field.

E. C. ATKINS & CO., Indianapolis—This exhibit will consist of metal cutting saws and machinery including hack saw blades and frames. A special steel frame which recently has been introduced also will be on display. The exhibit will be in charge of E. S. Norvell, Robert Eveland and B. D. Tompson.

AUSTIN CO., Cleveland — Photographs, drawings and blueprints of foundries which have been designed, erected and equipped by this company will be on display. Literature describing modern methods of construction also will be distributed. The firm will be represented by G. A. Bryant, H. E. Stitt, O. D. Conover, A. F. Plant, H. L. Cornelison and E. F. Scott.

AUTOMATIC TRANSPORTATION CO., Buffalo—Electric industrial trucks will be shown and demonstrated at the booth of this company.

FRANZ K. AXMANN, Koln-Ehrenfeld, Ger-

Michigan Foundrymen Entertaining A. F. A.

Executive Committee

Robert Crawford, Atlas Foundry Co., Detroit, general chairman.
J. J. Boland, Griffin Wheel Co., Detroit, vice chairman.
Russell M. Scott, Packard Motor Car Co., Detroit, secretary.
Fred A. Cowen, Warner R. Thompson Co., Detroit, treasurer.

Finance Committee

Jesse D. Stoddard, Detroit Testing Laboratory, Detroit, chairman.
Hugh Martin, Detroit Gray Iron Foundry Co., Detroit.
E. S. Van Dalson, Dodge Bros., Detroit.
E. J. Woodison, E. J. Woodison Co., Detroit.

Entertainment Committee

W. J. Cluff, Frederic B. Stevens, Inc., Detroit, chairman.
F. Dodge, Werner G. Smith Co., Detroit, vice chairman.
W. J. Muhlitner, Great Lakes Foundry Sand Co., Detroit, vice chairman.
P. W. Mulder, Almont Mfg. Co., Almont, Mich.
R. E. Prussing, Whiting Corp., Detroit.
Vaughan Reid, City Pattern Works, Detroit.
Clifford L. Snyder, Detroit Testing Laboratory, Detroit.
Edward Straus, Capitol Brass Works, Detroit.
William H. Dee, Frederic B. Stevens, Inc., Detroit.
A. E. Sweet, Holmes Foundry Co., Port Huron, Mich.

Plant Visitation Committee

H. M. Lane, H. M. Lane Co., Detroit, chairman.
H. W. Dietert, U. S. Radiator Corp., Detroit, vice chairman.
G. L. Grimes, Grimes Molding Machine Co., Detroit, vice chairman.
K. C. Babo, Dodge Brothers, Detroit.
M. A. Beltaire Jr., 805 Hammond building, Detroit.
L. G. Blunt, Holmes Foundry Co., Port Huron, Mich.
G. A. Burman, E. J. Woodison Co., Detroit.
R. Carolin, R. Carolin Brass Works, Detroit.
J. W. Collins, U. S. Aluminum Co., Detroit.
Fred A. Cowen, Warner R. Thompson Co., Detroit.
G. C. Curtis, Dodge Brothers, Detroit.
F. Dodge, Werner G. Smith Co., Detroit.
R. F. Flinterman, Michigan Steel Castings Co., Detroit.
J. C. Green, J. C. Green Pattern Co., Detroit.
F. Harrison, Riley Stoker Co., Detroit.
P. J. McManus, Buhl Malleable Co., Detroit.
M. T. Mortensen, W. W. Sly Mfg. Co., Detroit.
J. A. Moore, Acme Foundry Co., Detroit.
J. A. Patterson, J. W. Dopp Co., Detroit.
E. W. Pike, Detroit Steel Castings Co., Detroit.
R. E. Prussing, Whiting Corp., Detroit.
H. Rypsam, American Car & Foundry Co., Detroit.
H. Rayner, Dodge Brothers, Detroit.
C. J. Skeffington, Grimes Molding Machine Co., Detroit.
H. B. Swan, Cadillac Motor Car Co., Detroit.
W. Ed. Thompson, Warner R. Thompson Co., Detroit.
F. J. Wahls, Wilson Foundry & Machine Co., Pontiac, Mich.
J. H. Ware, Bohn Aluminum & Brass Corp., Detroit.

Hotel Committee

Wm. J. Muhlitner, Great Lakes Foundry Sand Co., Detroit, chairman.
George A. Fuller, Federal Foundry Supply Co., Detroit, vice chairman.
R. Ronceray, Central Foundry Division, Saginaw, Mich., vice chairman.
C. W. Jinnette, Norton Co., Detroit.
E. J. Swink, Monarch Pattern Works, Detroit.
J. W. Dopp, J. W. Dopp Co., Detroit.
J. C. Woodison, E. J. Woodison Co., Detroit.
E. O. Book, Kelsey Wheel Co., Inc., Detroit.
W. W. Bowring, F. B. Stevens, Inc., Detroit.
H. P. MacKinnon, Great Lakes Foundry Sand Co., Detroit.

Publicity Committee

J. J. Boland, Griffin Wheel Co., Detroit, chairman.
J. A. Patterson, J. W. Dopp Co., Detroit.
P. Lewis, *Iron Age*, Detroit.

Ladies Committee

J. L. Mahon, American Car & Foundry Co., chairman.
Mrs. Lucia V. Grimes, vice chairman.
Mrs. K. C. Babo, secretary.
Mrs. Fred Erb, treasurer.

Registration

Mrs. Fred Erb.
Mrs. W. J. Cluff.

Shopping Guides and Information

Mrs. Warner R. Thompson.

Hostess House at Fair Grounds

Mrs. Russell Scott, chairman.
Mrs. C. J. Skeffington.
Mrs. Joseph C. Green.
Mrs. Henry M. Lane.
Mrs. Fred A. Cowen.
Mrs. G. C. Anderson.

Transportation

Mrs. K. C. Babo, chairman.
Mrs. John Moore.
Miss Helen G. Crawford.

Entertainment

Reception and tea, Monday, Sept. 27.
Mrs. R. F. Flinterman, chairman.
Mrs. Frederic Stevens.
Mrs. Robert Crawford.

Luncheon, Tuesday, Sept. 28.
Mrs. S. W. Utley, chairman.
Mrs. Harry B. Swan.
Mrs. David R. Wilson.
Mrs. James A. Ballard.
Mrs. Hugh Martin.

Luncheon or Supper
Mrs. John C. Woodison, chairman.
Mrs. Charles B. Bohn.
Mrs. E. J. Woodison.
Mrs. Vaughan Reid.
Mrs. Edwin L. Grimes.
Mrs. John B. Carmichael.

Gift or Souvenir

Mrs. J. J. Boland, chairman.
Mrs. H. Rypsam.
Mrs. George Scott.

Transportation Committee

W. R. Thompson, Warner R. Thompson Co., Detroit, chairman.
P. W. Mulder, Almont Mfg. Co., Almont, Mich., vice chairman.
F. Dodge, Werner G. Smith Co., Detroit, vice chairman.
Bernard Bathe, division passenger agent, Michigan Central Railway.
Fred A. Young, division passenger agent, Pere Marquette Railway.
Wm. M. Klare, manager Statler Hotel.
P. G. Findley, traffic manager, Dodge Brothers.
Frank Bromley, Detroit Foundry Co.

Reception Committee

Chester M. Culver, Employers' association of Detroit, chairman.
W. Pike, Detroit Steel Castings Co., Detroit, vice chairman.
F. Tout, Griffin Wheel Co., Detroit, vice chairman.
H. Rypsam, American Car & Foundry Co., Detroit.
R. Carolin, R. B. Carolin Brass Co., Detroit.
S. P. Thomas, Scott Valve Co., Detroit.
T. W. Kirby, A. P. Wagner Co., Detroit.
Arnold Lenz, Saginaw Products Co., Saginaw, Mich.
George W. Grant, Secretary, Employers' association, Detroit.

Golf Committee

Fred Erb, Erb-Joyce Foundry Co., Vassar, Mich., chairman.
Vaughan Reid, City Pattern Works, Detroit, vice chairman.
Hugh Martin, Detroit Gray Iron Foundry, Detroit.

many—This company will exhibit an impeller type sand preparing and transporting machine in operation and a sand throwing type molding machine which is used in connection with the sand preparing and transporting unit.

AYERS MINERAL CO., Zanesville, O.—Molding sand for ferrous and nonferrous castings will be shown at the booth of this company. Silica sand for steel molding also will be displayed.

B

BAKER-RAULANG CO., Cleveland—This company will exhibit a charging truck for handling stacks of annealing pots in malleable iron foundries, and a locomotive type crane truck, an elevating truck and an electric tractor. A. J. Gates, R. E. Willis, D. C. Parry, H. B. Greig and D. L. Darnell will represent the company.

C. O. BARTLETT & SNOW CO., Cleveland—Equipment for continuous handling and and milling of foundry sand, photographs of recent installations and continuous equipment for handling and preparing foundry molding sand and for carrying molds, flasks and cores will be shown by this company, which will be represented by H. L. McKinnon, M. E. First, H. C. Orr, S. Gertz, and J. E. Bates.

H. L. BAUMGARDNER CORP., Chicago—This company will display tapered slip flasks and a line on core oil. Member of the company in attendance will be H. L. Baumgardner, H. A. Whiting, Edgar F. Tierney, John Purvis Jr., W. W. Ford, Chas. Miller, Frank Snyder and J. B. Skelly.

BEARDSLEY & PIPER CO., Chicago—This company will show motive and tractor types of sand throwing machines designed to cover the jobbing and production fields. It also will display castings made with machines of these types. The company will be represented at the convention by E. O. Beardsley, W. F. Piper, John S. Sammons, H. G. Schlichter, Ed. O'Connor, E. L. Mitchell, C. H. Ellis, Robert Snow, A. L. Miller, Harold Lind and Pete Stefan.

BELLEVUE INDUSTRIAL FURNACE CO., Detroit—A tilting type brass melting furnace, a miniature model of an aluminum melting furnace having fire brick lining and an oil burner, an assortment of special shape fire brick, and oil and gas burners will be shown by this company. Walter E. Hinz and Louis J. Raymo will be in charge.

BERKSHIRE MFG. CO., Cleveland—Several types of molding machines including a pattern draw squeezer machine, jolt squeezer machine of the cross head type, jolt squeeze stripping plate machine, and jolt squeeze molding machine with swinging head, will be shown by this company. The representatives will be G. L. Cannon, G. F. York and Horace F. Henriques.

BETHLEHEM STEEL CO., Bethlehem, Pa.—Numerous castings containing pig iron manufactured by this company will be shown at its booth. Some of these castings will be cut and fractured to show the compact structure and the characteristics of cast iron containing this pig iron. Pictures showing the mining of the ore and the manufacture of the pig iron also will be on display. The representatives of the company will be D. A. Barkley, H. P. Kreulin, F. E. Fisher, R. MacDonald, G. A. Richardson, and J. C. Tobias.

S. BIRKENSTEIN & SONS INC., Chicago—This company will exhibit various nonferrous metals including ingot brasses, manganese bronze, silver ingots, aluminum, copper, brass, zinc, antimonial lead and other products. The representatives will be George Birkenstein, Harry Birkenstein, F. F. Heyman, Eli Brown, and C. B. Raphael.

BLACK & DECKER MFG. CO., Baltimore—A variety of electric drills for every pur-

Exhibitors in the Agricultural Building

Abrasive Industry 41, 54
Advance Milling Co....19
Ajax Electrothermic Corp. 127
Ajax Metal Co. 123-126
Albany Sand & Supply Co....44, 46
American Vent Wax Co....13
Asbury Graphite Mills 61
Austin Co. 25-27
Ayers Mineral Co. 23, 24
Bellevue Industrial Furnace Co....99
Bethlehem Steel Co. Inc. 50, 52
S. Birkenstein & Sons, Inc....11
Boyer Campbell Co. 133
British Aluminum Co. Ltd....78
Carborundum Co. 8, 9, 10
Frank D. Chase, Inc. 37, 39
Cleveland Flux Co. 136
L. A. Cohn & Bro. 131
Corn Products Refining Co. 7
Daily Metal Trade 41, 54
Dayton Oil Co....116
Diamond Clamp & Flask Co....71
Joseph Dixon Crucible Co....22
Electric Furnace Co....134
Electric-Chemical Pattern & Mfg. Co....15
Electro Refractories Corp. 130
Fanner Mfg. Co. 6
Federal Foundry Supply Co....45, 47
THE FOUNDRY 41, 54
Fowler & Union Horse Nail Co....135
Great Lakes Foundry Sand Co....110
J. W. Hallett & Co. Inc....33
Benj. Harris & Co....87, 89
Hill & Griffith Co. 30, 32
Holcroft & Co. 93
Hougland & Hardy 103
Illinois Clay Products Co....73, 75
Indiana Coke & Gas Co....98
International Correspondence Schools....12
International Nickel Co. 21, 28
Iron Trade Review 41, 54
Chas. C. Kawin Co. 34
Keener Sand & Clay Co....79
Spencer Kellogg & Sons, Inc....29, 42
Knefler-Bates Mfg. Co....132
H. W. Knight & Son....17
H. Kramer & Co....106, 108
Chas. A. Krause Milling Co....4, 5
Lindsay-McMillan Co....85
Mathieson Alkali Works, Inc....57
Metal & Thermit Corp. 65
Miller-Hurst Corp. 114
H. E. Mills Mfg. Co. 14
Niagara Falls Smelting & Refining Corp. 84, 86
Norma-Hoffman Bearings Corp....38, 40
Patent Cereals Co....88
Peerless Sand Co....83
Penton Publishing Co....41, 54
George W. Perks & Co....122
Charles Pettinos 111
Pickands, Brown & Co....1
Portage Silica Co....92
Quigley Furnace Specialties Co....119
Robeson Process Co. 70
Wm. C. Robinson & Son Co....112
Rohrbacher Shoe Co....16
Ross-Tacony Crucible Co....31
Sabin Machine Co....18
Simons Paint Spray Brush Co....58
Werner G. Smith Co....51-55, 64-68
Standard Silica Co. 100, 102
Frederic B. Stevens, Inc. 120, 121
Superior Sand Co....97
Superior Sizing Co. Inc....118
Swan-Finch Oil Corp....101
Taylor Instrument Cos....107
Warner R. Thompson Co....96
Tiona Petroleum Co....109
U. S. Graphite Co. 36
U. S. Silica Co. 137
Whitehead Bros. Co....43, 56

pose will be shown at the booth of this company.

BLAW-KNOX CO., Pittsburgh—This company will present information on various types of industrial plants, including foundries, which it has designed and built.

BLACK DIAMOND SAW & MACHINE WORKS, Natick, Mass.—Various types of metalworking tools will be in operation at the booth of this company.

BLYSTONE MFG. CO., Cambridge Springs, Pa.—This company will show in operation a foundry sand mixer with screen and motor attached. The exhibit will be in charge of Luther G. Conroe and C. E. McKinney.

BOYER-CAMPBELL CO., Detroit—The exof this company will consist of a line of safety equipment, in addition to a display of flexible shafts and flexible shaft equipment. The booth will be in charge of R. N. Brayer and E. N. Luckey.

BRADLEY WASHFOUNTAIN CO., Milwaukee—This company will exhibit a special fixture for foundry washrooms which is equipped with an automatic foot control. W. H. Silpath and D. T. Randall will be in charge of the display.

BRIDGEPORT SAFETY EMERY WHEEL CO., Bridgeport, Conn.—This company will show a radial swing frame grinder, alternating current direct driven floor grinders and a motor driven buffing lathe. The exhibit will be in charge of H. H. Peck, I. L. Burritt and H. E. Smith.

BRITISH ALUMINIUM CO., LTD., London, England—This exhibit will consist of virgin aluminum ingot, and a series of aluminum ingots of different shapes in different grades of commercial purity, together with a series of samples showing the evolution of the metal from the ores. The company will be represented by Ernest V. Pannell.

BUCKEYE PORTABLE TOOL CO., Dayton, Ohio—This company will exhibit a line of portable air tools, including grinders, buffers, drills and brushes. The representatives in charge of the display will be W. W. Price, W. R. Gummere, H. O. Gummere, Chan Humphrey, J. W. Cunningham and Harry W. Leighton.

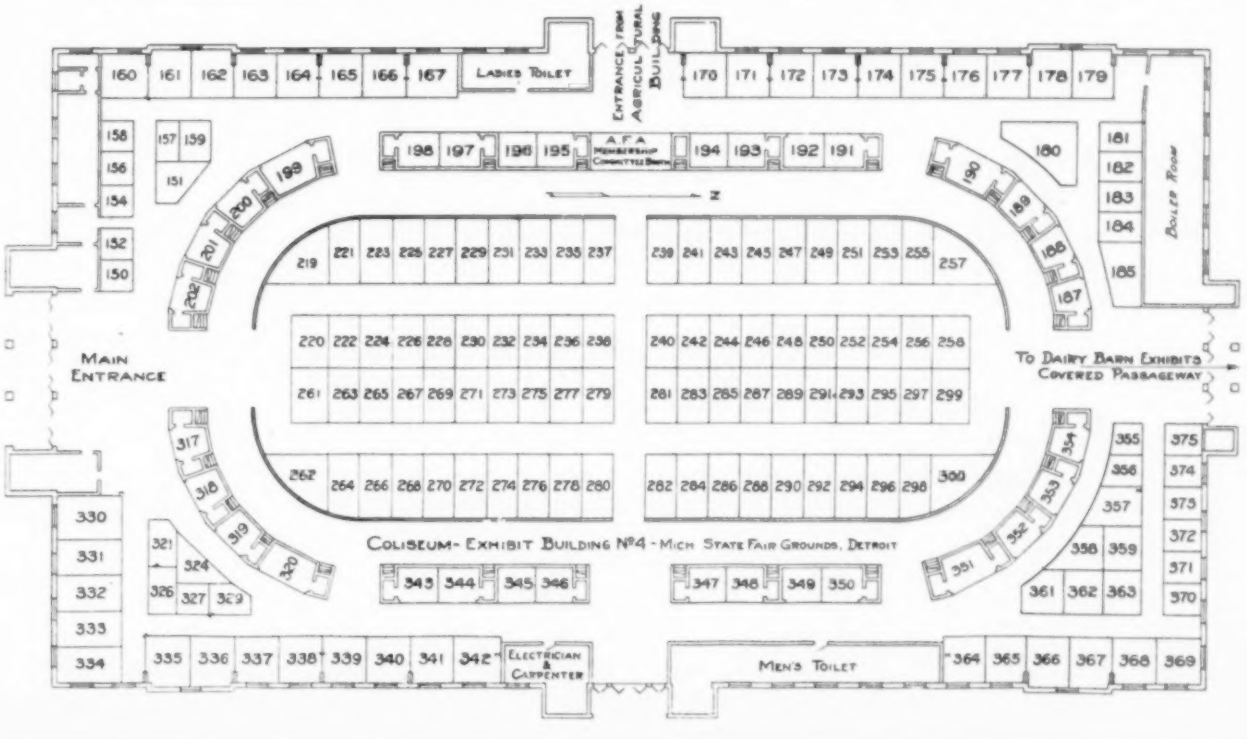
C

CAMPBELL-HAUSFELD CO., Harrison, O.—A tilting crucible melting furnace, stationary crucible melting furnace, tilting aluminum melting furnace using cast iron pot and a noncrucible melting furnace as well as line of vibrators and oil strainers will be shown by this company. The representatives will be J. S. Armour and Edward B. Hausfeld.

CARBORUNDUM CO., Niagara Falls, N. Y.—This exhibit will consist of a line of grinding wheels, abrasive paper and cloth, rubbing bricks, etc., as well as a furnace of the crucible tilting type lined with a special refractory cement and equipped with a sectional lid manufactured by that company. The display will also contain refractory

Exhibitors in the Coliseum

Air Reduction Sales Co.....224, 226
Allen Air-Turbine Ventilator Co.....190
Alloys & Products, Inc.....199
American Brake Shoe & Foundry Co...373
American Electric Motors, Inc.....181-183
American Engineering Co.....261, 263, 265
American Foundry Equipment Co.....
.....244-258, 285-299
Ames Shovel & Tool Co. 372
Automatic Transportation Co.....163, 164
Franz K. Axmann 331-334
American Steel Abrasive Co.....351
Baker-Raulang Co. 335, 336
C. O. Bartlett & Snow Co.....278, 280
Berkshire Mfg. Co. 283
Blaw-Knox Co. 177
Blystone Mfg. Co. 340
Carr Fastener Co. 184
Carter Bloxonend Flooring Co.....159
Chicago Crucible Co. 185
Clark Tructractor Co.....374, 375
Cleveland Wire Spring Co.....352
Clipper Belt Lacer Co.....354
Crescent Brass & Pin Co.....344
Crown Rheostat & Supply Co.....192
Cresson Morris Co.....368
Deister Concentrator Co.....370
Detroit Core Oil Co. 197
Dock & Mill Co. 174, 175
Eastern Clay Products, Inc.....339
Electric Storage Battery Co.....166
Electric Welding Machine Co.....160
Fairbanks, Morse & Co.....172
Falk Products Co. 200
Foundries Service Corp. 341, 342
Great Western Mfg. Co. 371
Grimes Molding Machine Co.....223
Hammond Iron Co. 193
Hayward Co. 240, 242
Howell Electric Motors Co.....367
International Molding Machine Co...247-257
Jennison-Wright Co. 353
Johnston & Jennings Co.....220, 222
W. A. Jones Foundry & Machine Co...219
Kindt-Collins Co. 162
King Refractories Co.....189
H. M. Lane Co. 202
Lava Crucible Co. of Pittsburgh.....176
Lewis-Shepard Co. 321
Louden Machinery Co.....228-232, 269-273
R. W. McIlvaine Co. 364, 365
Marshall Blow Pipe Co. 165
Mathews Conveyor Co. 281
Michigan Smelting & Refining Co.
.....358-362
Alexander Milburn Co. 366
Milwaukee Foundry Equipment Co...262-266
Modern Pouring Device Co.....330
Moline Iron Works 267
Mt. Jewett Fire Clay Co.....157
Wm. H. Nicholls Co., Inc.....282-300
North American Mfg. Co. 189
Oiless Core Binder Co.....191
Osborn Mfg. Co. 227-237
Oxweld Acetylene Co. 270, 272
George F. Pettinos 194
Reeves Pulley Co. 188
Rogers Brown & Crocker Bros. Inc.
.....355-357
Royer Foundry & Machine Co.....239-245
Schmitz Co. 154
Semet-Solvay Co. 170, 171
Skeppstedt-Erickson Co. 275
Skybryte Co. 198
Smith-Monroe Co. 343
Smith Oil & Refining Co. 318
Springfield Aluminum Plate & Casting Co. 359
Sterling Wheelbarrow Co. 180
Sugar Pine Sales Co.....337, 338
Tabor Mfg. Co. 234-238, 277, 279
Transmission Ball Bearing Co. Inc.....179
W. S. Tyler Co. 167
United Compound Co. 317
Jervis B. Webb Co. 221
Weldit Acetylene Co. 320
G. H. Williams Co. 173
Young Brothers Co. 274, 276



brick and cements. The representatives will be S. F. Courter, O. C. Dobson, H. E. Kerwin, Leonard Pitt, H. H. Wiley, C. A. Dutton, S. A. Fenno and A. A. Lees.

CARR FASTENER CO., Cambridge, Mass.—This company will show complete industrial lubrication service for foundry and other mechanical equipment and compressors, fillers, fittings, tanks and automatic reservoir cups. Their booth will be in charge of A. W. Smith, J. N. Fauver, H. H. Barrows.

CARTER BLOXONEND FLOORING CO., Kansas City—This exhibit will consist of standard 8-foot lengths of flooring made up in a panel, illustrating the method of laying this floor over concrete or wood flooring. The company will be represented by J. G. Galvin, S. F. Bridges, Robt. Gordon and A. E. Giese.

FRANK D. CHASE, INC., Chicago—This company will exhibit foundry engineering plans, layouts, and photographs of steel, gray iron and brass foundries. Representatives will be Frank D. Chase and C. R. Cady.

CHICAGO CRUCIBLE CO., Chicago—Graphite crucibles and special graphite refractories will constitute the display of this company. The representatives will be A. F. Hottinger, J. P. Foraker, W. MacFadden, J. G. Crowe and J. W. Mann.

CHICAGO PNEUMATIC TOOL CO., New York—This company will operate a compressor furnishing air for sand rammers, chipping hammers and air grinders. The company also will show grinders as well as a line of portable electric screw drivers, tappers and drills. The following will represent the company: A. E. Goodhue, H. G. Barbee, A. C. Andreson, H. J. Bannister, H. C. Gilligan, W. C. Straub, J. L. Westenhaver, R. F. Eissler and T. G. Smallwood.

CHISHOLM-MOORE MFG. CO., Cleveland—Chain hoists and trolleys, electric hoists and overhead track for this type hoist will be shown at the booth of this company.

CLARK TRUCTRACTOR CO., Buchanan, Mich.—Gasoline propelled industrial vehicles of the tractor and the lifting type will be shown by this company which will be repre-

Exhibitors in the Dairy Building

Adams Co. 423, 425
Arcade Mfg. Co. 456-462
E. C. Atkins & Co....377
H. L. Baumgardner Corp. 413, 466, 468, 470
Beardsley & Piper Co....418-428
Black Diamond Saw & Machine Works 445
Black & Decker Mfg. Co....525-533
Bradley Washfountain Co....487
Bridgeport Safety Emery Wheel Co....411
Buckeye Portable Tool Co....588
Campbell-Hausfeld Co....441, 443
Chicago Pneumatic Tool Co....543-547
Chisholm-Moore Mfg. Co....379, 381
Cleveland Pneumatic Tool Co....499, 501
Combined Supply & Equipment Co....498
Dayton Pneumatic Tool Co....552
Wm. Demmler & Bros. 393-399
Detroit Electric Furnace Co....521, 523
Detroit Hoist & Machine Co....494
Electric Controller & Mfg. Co....427, 429
Elwell-Parker Electric Co....486
Falk Corp. 583, 585
Foundry Equipment Co....482, 484
Rudolf Geiger 589
General Electric Co. 553-557
Globe Steel Abrasive Co....535
Harnischfeger Sales Corp....579, 581
R. G. Haskins Co. 500
Herman Pneumatic Machine Co....392-396
Holley Carburetor Co. 591, 593
Independent Pneumatic Tool Co....402, 404
Ingersoll-Rand Co. 571-577
Keller Mechanical Engineering Corp. 434, 436
William H. Keller, Inc....476
Keystone Lubricating Co. 438, 440
Lakewood Engineering Co....388, 390
Link-Belt Co. 448-454
C. E. McArthur & Co. 493
J. S. McCormick Co. 435-439
MacLeod Co. 414, 416
Monarch Engineering & Mfg. Co....387-391
National Engineering Co....503-507, 558-562
New Haven Sand Blast Co....576-586
Northern Engineering Works 544, 546
Norton Co. 495, 550
S. Obermayer Co. 509, 511, 564, 566
Oliver Machinery Co....376-386
Pangborn Corp. 467-485, 520-538
Pittsburgh Electric Furnace Corp. 593, 595
Porter-Cable Machine Co....432
Production Equipment Co....590-594
Racine Tool & Machine Co....433
Richards-Wilcox Mfg. Co....489, 491
Rollway Bearing Co. Inc....548
Royersford Foundry & Machine Co. 478, 480
Ruemelin Mfg. Co. 563
Safety Emery Wheel Co....383, 385
Shepard Electric Crane & Hoist Co. 401-407
W. W. Sly Mfg. Co....449-459, 502-512
Spencer Turbine Co....492
Standard Sand & Machine Co....496
Stoney Foundry Engineering & Equipment Co. 410, 412
Sullivan Machinery Co. 406, 408
Sunstrand Machine Tool Co....497
Swartwout Co. 565
Tessmer Machine & Tool Co....542
Truscon Steel Co. 415-421
U. S. Electrical Tool Co. 472, 474
Wadkin & Co. 461, 463
Wadsworth Core Machine & Equipment Co. 488
J. D. Wallace & Co. 447
Warner & Swasey Co. 490
Westinghouse Electric & Mfg. Co 554, 556
Westinghouse Traction Brake Co....537, 539
Whiting Corp. 513-517, 568-572
E. J. Woodison Co. 442-446
Worthington Pump & Machinery Corp. 559,561
Yale & Towne Mfg. Co....514, 516

sented by E. B. Ross, J. W. Taylor and C. E. Staninger.

CLEVELAND FLUX CO., Cleveland—This company will show samples of its line of fluxes.

CLEVELAND PNEUMATIC TOOL CO., Cleveland—This company will show a line of sand rammers for floor, flask, bench and core ramming, air grinders, portable air tools for riveting, chipping, drilling, core breaking, etc., foundry pipe and hose fitting, couplings, and air valves. The representatives will be H. S. Covey, A. Scott, J. T. Graves, H. C. Newton, R. E. Ahern, G. M. Smalley, R. E. Manning, C. D. Garner, Wm. Oehrle, and A. M. Hughes.

CEVELAND WIRE SPRING CO., Cleveland—Steel foundry barrels, boxes, core racks and other handling equipment will be featured at the booth of this company. Representatives will be C. C. Klingman, O. L. Trainor, and C. B. Camp.

CLIPPER BELT LACER CO., Grand Rapids, Mich.—Four models of belt lacers, hooks, belt cutters and rawhide pins will be displayed at the booth of this company.

L. A. COHN & BRO., INC., Chicago—Brass and bronze ingots, aluminum alloys, virgin nonferrous metals and alloys, and castings made from these alloys will be shown by this company. The representatives will be as follows: L. A. Cohn, Lee Kahn, M. S. Cohn, Morris Isaacson, H. H. Klein.

COMBINED SUPPLY & EQUIPMENT CO., INC., Buffalo—Foundry and pattern shop supplies and equipment including chaplets, skim gates and a special machine for applying paste to cores will be exhibited. The company will be represented at the convention by S. LeViness Jr., C. L. Jackson, Geo. H. Bowers and Henry Bowers.

CORN PRODUCTS REFINING CO., New York—This company will display a core binder of its manufacture and will operate a small electric oven baking cores. Representatives will be S. B. Krantz, F. G. Faller Jr., A. H. Kreischer, and H. A. Crown.

CRESCENT BRASS & PIN CO., Detroit—A line of chaplets and pins will be on display at the booth of this company.

CRESSON MORRIS CO., Philadelphia—

CROWN RHEOSTAT & SUPPLY CO., Chicago—Single spindle electric driven geared polishing lathes, a belt driven ball bearing polishing lathe, electric driven mechanical plating barrels and some rheostats will be on display at the booth of this company. The exhibit will be in charge of S. E. Huenerfauth.

D

DAILY METAL TRADE, Cleveland—The booth of this company will be fitted up as a rest room where those in attendance at the convention are invited to make their headquarters. The representatives will be C. J. Stark, J. D. Pease, E. L. Shaner, L. C. Pelott, A. L. Klingeman, S. H. Jasper, V. E. Dolan and W. W. Maloney.

DAYTON OIL CO., Dayton, O.—Sample of cores and the line of core oil distributed by this company will be on display. The booth is in charge of D. S. Hopping and George Storer.

DAYTON PNEUMATIC TOOL CO., Dayton, O.—Various types of pneumatic tools manufactured by this company will be on display.

DEISTER CONCENTRATOR CO., Ft. Wayne, Ind.—A concentrating table for the recovery of minerals from ash will be featured by this company.

WM. DEMMLER & BROS., Kewanee, Ill.—This company will show its machine for blowing cores of various shapes. The machine will be in operation.

DETROIT CORE OIL CO., Detroit—Samples of core oils manufactured by this company will be on display at the booth.

DETROIT ELECTRIC FURNACE CO., Detroit—This company will have a 350-pound electric furnace in operation showing transformers and control equipment. Products made in the electric furnace, including brass and bronze castings, bearing metals, aluminum bronze, nickel, silver and other nonferrous products also will be shown. The representatives will be Edwin L. Crosby, Albert E. Rhoads, L. B. Barker and J. F. Duffy.

DETROIT HOIST & MACHINE CO., Detroit—Handling equipment for foundries will constitute the display of this company.

DIAMOND CLAMP & FLASK CO., Richmond, Ind.—A line of snap molding flasks, steel bands, jackets, core boxes, wedges, clamps, core plates as well as steel flask plates will be shown at the booth of this company. The exhibit will be in charge of F. J. Gartside and E. A. Kinley.

JOSEPH DIXON CRUCIBLE CO., Jersey City, N. J.—Various types of graphite crucibles used in the foundry may be seen at the booth of this company. The representatives will be L. W. Brower, R. R. Belleville, F. R. Brandon, R. H. Brinkerhoff, A. L. Haasis, R. F. Leonard, H. P. Smith and C. A. Shaw.

DOCK & MILL CO., North Tonawanda, N. Y.—Pine lumber in various thicknesses will be shown at the booth of this company. In addition, a large soft textured white pine saw log with both ends painted showing how the log is sawn into pattern, flask and templet lumber also will be shown. The exhibit will be in charge of Elmer J. Semon, J. D. Pierce and Walter M. Nantke.

E

EASTERN CLAY PRODUCTS, INC., Rochester, N. Y.—This company will exhibit its product for reclaiming used foundry sand. The exhibit at the convention will be in charge of S. H. Cleland, R. L. Cleland and R. S. Holland.

THE ELECTRIC CONTROLLER & MFG. CO., Cleveland—Push button operated automatic starters for direct and alternating current motors, automatic compensators for starting squirrel cage and synchronous motors, crane controllers, contactors, etc. will be shown by this company. Representatives in charge will be E. F. Vidro and W. J. Sonnenburg.

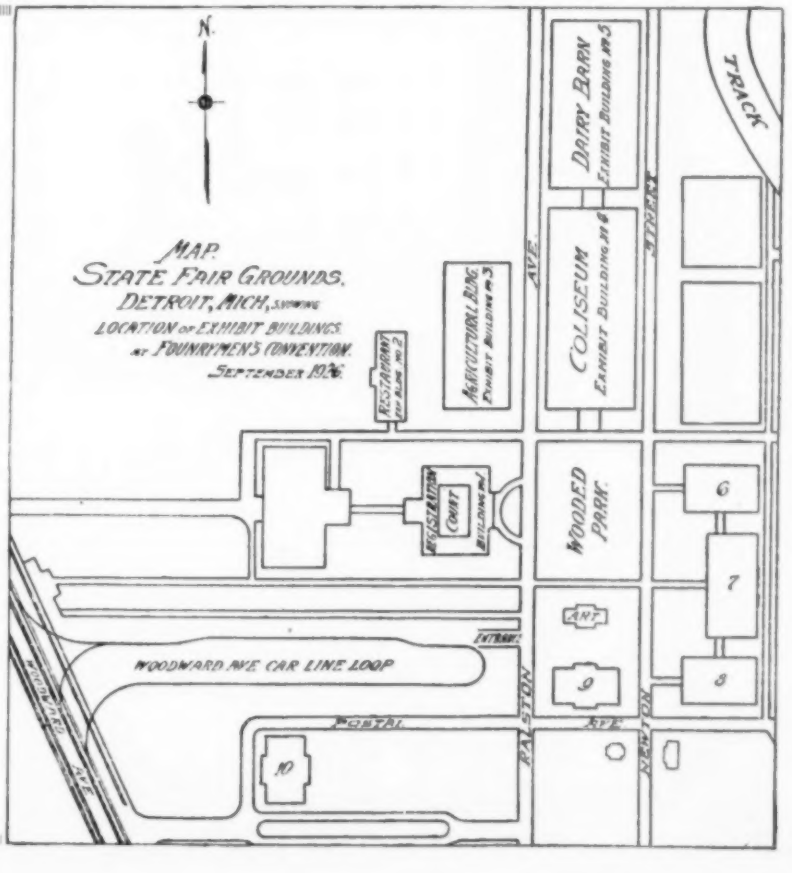
ELECTRIC FURNACE CO., Salem, O.—Illustrative and descriptive matter regarding electric furnaces for heat treating applications

Location of Buildings at the Fair Grounds

THE group of buildings at the Michigan State Fair grounds, Detroit, which will house exhibits and technical session at the thirteenth annual convention of the American Foundrymen's association, is shown in the accompanying map.

Registration and information headquarters will be located in building No. 1, just north of the street car entrance. Two meeting rooms also will be provided in this building and a third in building No. 6. Restaurant and dining service will be found in building No. 2. The Agricultural building, Coliseum and the Dairy building, shown on the map as buildings No. 3, 4 and 5 respectively, will be used entirely for the exhibits.

The Michigan State Fair grounds are within the city limits of Detroit on Woodward avenue, eight miles north of Grand Circus park. Woodward avenue street cars operate on a regular six-minute schedule to the fair grounds stopping at the end of the loop near Ralston avenue.



JESSE D. STODDARD
J. J. BOLAND
ROBERT CRAWFORD
W. J. CLUFF
RUSSELL M. SCOTT
W. J. MUHLITNER
W. R. THOMPSON
J. L. MAHON
EVERETT W. PIKE
FRED A. COWEN
H. M. LANE
FRED ERB

will feature the display of this company. R. F. Benzinger, C. L. Foster, F. J. Peterson, S. Floyd Keener, F. T. Cope and A. H. Vaughan will be in charge of the exhibit.

ELECTRIC STORAGE BATTERY CO., Philadelphia—Batteries for electric industrial trucks and tractors will be exhibited at the booth of this company, which will be in charge of W. Van C. Brandt, P. H. Martin and J. H. Miller.

ELECTRIC WELDING MACHINE CO., Detroit—This exhibit will consist of electric welding apparatus.

ELECTRO-CHEMICAL PATTERN & MFG. CO., Detroit—Copper patterns and core boxes made by this company will be exhibited. The representatives will be A. K. Laukel, J. H. Laukel, and R. E. Coy.

ELECTRO REFRACTORIES CORP., Buffalo—Special crucible and refractory brick will be shown by this company.

ELWELL-PARKER CO., Cleveland.—A malleable furnace charger, a heavy duty electric revolving and portable crane, and a 5-ton electric lift truck will be shown at the booth of this company.

F

FAIRBANKS, MORSE & CO., Chicago—A special display of ball bearing motors including an enclosed ventilator motor especially adapted to foundry work, a sectioned ball bearing motor demonstrating the operation and a new grease tube method of lubrication will be featured at the booth of this company. E. J. Hay will be in charge of the exhibit.

FALK CORP., Milwaukee.—A miscellaneous collection of small steel castings, several new herringbone gear speed reducers, both single and double reduction, and a machine to demonstrate flexible couplings to withstand excessive misalignment will be displayed by this company.

FALK PRODUCTS CO., Cadillac, Mich.—This company will show samples of adhesives and binders for use in making cores. The representatives will be R. H. Mills, L. M. Geer and D. O. Green.

FANNER MFG. CO., Cleveland—This company will show foundry chaplets of all kinds, tumbling mill stars made of hard white malleable iron and snap flask trimmings. The representatives will be J. R. Raible, C. G. Raible, C. E. Ireland, E. Durant, S. H. Gibson, P. D. McDonnell and F. W. Beck.

FEDERAL FOUNDRY SUPPLY CO., Cleveland—The booth of this company will be fitted up as a rest room with a number of samples on display. The representatives will be L. H. Heyl, G. H. Donoghue, T. H. Terry, B. Bernbaum, E. Kaye, O. E. Peterson, R. A. Sullivan, G. A. Fuller, F. J. Ross.

FOUNDRIES SERVICE CORP., New York—This company will exhibit a molding machine on which the flask is mounted integral with the machine.

THE FOUNDRY, Cleveland—The booth of this magazine will be fitted up as a rest room where the visitors at the convention are invited to make their headquarters. The representatives will be H. Cole Estep, Dan M. Avey, Pat Dwyer, Frank G. Steinebach, Charles Vickers, Edwin Bremer, J. D. Pease, J. F. Ahrens, G. B. Howarth, L. C. Pelott, S. H. Jasper, A. L. Klingeman, and V. E. Dolan.

FOUNDRY EQUIPMENT CO., Cleveland—Core and mold ovens including units of the car-type, portable rack-type and rolling drawer-type, together with portable core racks and mold cars will be displayed by this company. Representatives will be C. A. Barnett, H. W. Steindorf, M. A. Beltaire Jr., E. J. Welter and C. M. Holcomb.

FOWLER & UNION HORSE NAIL CO., Buffalo—Nails for use in the foundry will be shown by this company.

G

RUDOLF GEIGER, Ravensburg, Germany—This company will exhibit a machine for mixing sand in the foundry as well as a special box draw machine which may be used for any core box. The representatives will be Rudolph Geiger, Mayo A. Geiger and Eugene Brunner.

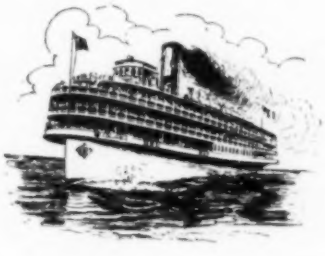
GENERAL ELECTRIC CO., Schenectady, N. Y.—The exhibit of this company will consist of motors, blowers, welding equipment and motor generator sets.

GLOBE STEEL ABRASIVE CO., Mansfield, O.—Specimens of castings showing the use of metal abrasives for cleaning purposes, samples of chilled shot and cornered steel grit will be on display at the booth of this company. The exhibit will be in charge of C. H. McConnell.

GREAT LAKES FOUNDRY SAND CO., Detroit—This company will display special molding, bank, silica and sand blast sands as well as fire clay and sand testing equipment. The representatives will be H. P. Mackinnon, John D. Croenweth, James G. Mendenhall and William J. Muhlitner.

GREAT WESTERN MFG. CO., Leavenworth, Kans.—This company will show in operation various models of gyratory foundry riddles.

GRIMES MOLDING MACHINE CO., Detroit—This company will exhibit a jar rammed roll-over machine, hand rammed roll-over machine



and a jolt stripping plate machine. The representatives will be C. J. Skellington and G. L. Grimes.

H

J. W. HALLETT & CO., Detroit—This company will display a line of books and dictionaries.

HAMMOND IRON CO., Birmingham, Ala.—

HARNISCHFEGER SALES CORP., Milwaukee—Various classes of cranes and a single line bucket especially adapted to foundry use will be shown by this company. Another feature of the display will be motion pictures of the crane in operation. The company will be represented by H. Harnischfeger, W. Harnischfeger, N. P. Farrar, E. Standfuss, H. H. Erkelenz, B. Van Horn, C. R. Lund, H. S. Strouse, and J. E. Brown.

BENJ. HARRIS & CO., Detroit—This company will exhibit various nonferrous metals and alloys.

R. G. HASKINS CO., Chicago—This company will exhibit flexible shaft equipment for grinding, sanding, drilling and filing operations as well as a complete supply of rotary files. W. E. Cole will be in charge of the display.

HAYWARD CO., New York—The features of this exhibit will be an air operated orange peel bucket, an electric motor clam shell bucket, and models of orange peel and clam shell buckets. Representatives of the company at the convention will be H. M. Davison, C. S. Sargent, E. R. Dwelle and H. C. Ryder.

HERMAN PNEUMATIC MACHINE CO., Pittsburgh.—This company will show several machines for the plain jarring, jar rollover and pattern drawing and jar stripping plate type. The representatives will be Thomas Kaveny, A. G. Doyle, Richard Harris, R. F. Ringle, I. J. Oesterling, T. A. Renkenberg, Alfred Herman, Edward Drueschel, C. W. Miller, R. P. Morgan, R. M. Porteous, W. W. Hughes, C. S. McMath, L. L. Johnston and Joseph Gibson.

HICKMAN, WILLIAMS & CO., Detroit—Pig iron and coke will be exhibited at the booth of this company.

HILL & GRIFFITH CO., Cincinnati—The booth of this company will be fitted up as a rest room for the entertainment of visitors at the convention. The representatives in charge will be John Hill, Bruce Hill, William Oberhelman, C. L. Gysin and M. H. Beatty.

HOLCROFT & CO., Detroit—This company will show drawings, photographs, and data on core ovens, melting furnaces and heat treating furnaces for the foundry industry. Special drawings will be shown of a new continuous malleable annealing furnace which recently has been installed at the Northwestern Malleable Iron Co.

HOLLEY CARBURETOR CO., Detroit—Castings will be made at the booth of this company in long life molds from metal melted in a furnace exhibited by the Pittsburgh Electric Furnace Corp. Continuous operation is planned. The exhibit will be in charge of S. M. Udale.

HOUGLAND & HARDY, Evansville, Ind.—This company will show samples of its line of foundry sands.

HOWELL ELECTRIC MOTORS CO., Howell, Mich.—This company will exhibit its line of electric motors.

I

ILLINOIS CLAY PRODUCTS CO., Joliet, Ill.—Samples of products including various preparations of fire clay, furnace cement and fire clay flour will be exhibited by this company. O. L. Jones, Paul Bechtner, M. I. Carpenter, E. N. Carpenter and E. C. Owen will represent the company.

INDEPENDENT PNEUMATIC TOOL CO., Chicago—A complete line of pneumatic tools and electric drills, including foundry hammers, hoists, sand rammers and portable air grinders, will be shown at the booth of this company. The representatives will be Adolph Anderson, R. S. Cooper, F. W. Buchanan, V. W. Robinson, W. A. Nugent, G. H. DuSell, A. H. Schuhl, Carl A. Novinger, A. G. Allen and C. T. Connelly.

INDIANA COKE & GAS CO., Terre Haute, Ind.—This company will show by-product coke in the foundry, egg and stove sizes, together with samples of coal from which this coke is produced. The representatives will be Leon Stern, Lewis D. McClaren, Adrian B. Weaver, Lloyd B. Davis and Thomas L. Kemp.

INGERSOLL-RAND CO., New York—Air compressors, pneumatic chipping hammers, pneumatic sand rammers, pneumatic hoists, pneumatic grinding machines, pneumatic riveting hammers and pneumatic drills will be shown at the booth of this company by George C. Williams, W. A. Ursem, and H. C. Burgess.

INTERNATIONAL CORRESPONDENCE SCHOOLS, Scranton, Pa.—The apprentice training division of this company will outline by charts, posters, and photographs, the apprentice training activities, facilities, and program, carried on by the company. The booth will be in charge of H. A. Frommelt, D. C. Vandercook and W. J. Hebard.

INTERNATIONAL MOLDING MACHINE CO., Chicago—A combination jar ramming power turn-over power draw molding machine, a combination jar ramming hand turn-over foot draw machine, jarring machines with air lifting cylinders, jolt squeezers, combination jar ramming hand stripping machines, combination jar ramming power stripping machines, jolt squeeze strip machines, hand stripping plate machines, hand ramming power turn-over molding machines and core making machines

HARRY RAYNER
R. E. PRUSSING
MRS. LUCIA V. GRIMES
M. A. BELTAIRE JR.
VAUGHAN REID
HUGH MARTIN
F. H. TOUT
K. C. BABO
MRS. J. J. BOLAND
H. W. DIETERT
J. A. PATTERSON

will be shown by this company. Representatives will be Edward A. Pridmore, W. W. Miller, Harold A. Pridmore, Lawrence D. Pridmore, Carl Levahn, E. G. Borgnis, M. J. Monahan, Luke S. Shannon, Hugh Gallagher, W. J. Rowley, W. J. Briggs, and Frank Seider.

INTERNATIONAL NICKEL CO., New York—Samples of iron and steel castings containing nickel will be shown by this company. A lathe also will be installed to demonstrate the machinability of gray iron to which nickel has been added. The representatives of the company will be F. S. Jordan, R. A. Wheeler, A. J. Wadhams, P. D. Merica, Charles McKnight Jr., T. H. Wickenden, D. M. Houston, J. D. Vonich and R. G. Waltenburg.

IRON TRADE REVIEW, Cleveland—The booth of this company will be fitted up as a rest room where those in attendance at the convention are invited to make their headquarters. The representatives will be Charles J. Stark, H. Cole Estep, J. D. Pease, E. L. Shaner, R. T. Mason, A. L. Klingeman, S. H. Jasper, L. C. Pelott, V. E. Dolan, W. W. Maloney.

J

JENNISON-WRIGHT CO., Toledo—Numerous types of wood block flooring for industrial buildings will be shown by this company.

JOHNSTON & JENNINGS CO., Cleveland—This company will operate a new type jolt squeeze machine, a new jolt squeeze pattern drawing machine, and a new jolt squeeze roll-over pattern draw machine. A plain air squeeze, plain jolt machine and jolt stripper, together with vibrators, hard iron stars and miscellaneous equipment also will be shown. Representatives will be T. J. Calhoun, R. W. Gramling, and J. L. Battenfeld.

W. A. JONES FOUNDRY & MACHINE CO., Chicago—This exhibit will consist of a line of speed reducers including a spur gear speed reducer and worm gear speed reducer. Several of the reducers will be in operation to show their application to conveyors of standard types. This display will be in charge of R. L. Shaw and Theodore Hegelman.

K

CHARLES C. KAWIN CO., Chicago—This booth will be fitted as a rest room for the visitors at the convention.

KEENER SAND & CLAY CO., Columbus—Samples of core and silica molding sands, fire brick and clay will be shown by this company.

WILLIAM H. KELLER, INC., Grand Haven, Mich.—Pneumatic tools including riveting and chipping hammers, rammers, pneumatic drills, grinders, etc., will be on display at the booth of this company. The representatives will be Guy S. Warren, Chandler Humphrey, Ernest Shaff, and W. E. Hall.

KELLER MECHANICAL ENGINEERING CORP., Brooklyn, N. Y.—A tool room machine equipped with attachment for jig boring and a cutter and radius grinder, as well as flexible shaft machines with accessories will be on display at the booth of this company. J. F. Keller, S. A. Keller, Jules Dierckx, P. D. Brown, Charles Bitter, G. I. Croll, and M. Mayer will be in charge of the display.

SPENCER KELLOGG & SONS, INC., Buffalo—This company will display core oils, cores made with these oils and finished castings. The representatives will be W. L. Goetz, V. A. Acer, M. Agster, E. G. Allen, E. J. Felt, E. A. Medbery, J. A. Miller, H. J. Strassberger, and J. N. Yaeger.

KEYSTONE LUBRICATING CO., Philadelphia—This company will demonstrate lubricants for air tools and electric motors and will show the application of a safety lubricator to stationary and moving machinery bearings. P. Cassady, M. C. Schwenk, Vic. Berguson, and F. D. Street will represent the company.

KINDT-COLLINS CO., Cleveland—This company will exhibit a line of pattern shop supplies and equipment including a display of white pine and mahogany pattern lumber. The representatives will be E. T. Kindt and V. I. Kimbel.

KING REFRACTORIES CO., Buffalo—High temperature cements, baffles and fire brick will be shown by this company.

KNEFLER-BATES MFG. CO., Indianapolis—Samples of cores produced with core binders and facing flour manufactured by this company will be shown at its booth. The representatives will be Ernest Knefler, Geo. B. Hill, Herbert J. Beyer and John A. Green.

H. W. KNIGHT & SON, Seneca Falls, N. Y.—This display will consist of a line of white metal and brass pattern letters and

figures as well as foundry trade marks. The representatives will be Robert Knight and Robert W. Knight.

H. KRAMER & CO., Chicago—Brass and bronze ingots and castings made from these metals will be shown by this company. H. Kramer, I. Kaden and L. Chapman will be the representatives.

CHAS. A. KRAUSE MILLING CO., Milwaukee—The booth of this company will be fitted up as a rest room for convention visitors. C. H. Smith, Guy E. Lund, H. D. Farris and Jos. M. Remmes will be in charge of the booth.

L

LAKEWOOD ENGINEERING CO., Cleveland—A lift truck, a dump body trailer and a dump body skid will be exhibited by this company. The representatives will be D. E. Van Deusen, Lion Gardiner, John Cavan, and W. A. Meddick.

H. M. LANE CO., Detroit—Photographs and drawings of the work done by this company will be shown at the booth which will be in charge of G. Pitt and H. M. Lane.

LAVA CRUCIBLE CO. OF PITTSBURGH, Pittsburgh—This company will exhibit a complete line of pit type and tilting type graphite crucibles for use in nonferrous melting plants. In addition crucible covers, crucible funnels, phosphorizers, sleeves, burner nozzles, skimmers and stirrers will be shown. The representatives will be P. L. Berkley, Furman South Jr., D. E. MacLean, C .E. Peck and R. P. South.

LEWIS-SHEPARD CO., Watertown Station, Boston—This company will exhibit elevating trucks, core rack trucks, portable elevators or stackers and steel leg platforms. The exhibit will be in charge of Henry B. Shepard and P. A. Heller.

LINDSAY-McMILLAN CO., Milwaukee—Core oils and compounds, cutting oils and compounds and cores made from these products will be exhibited by this company. The representatives will be Wm. R. Pate, J. A. Gitzen, E. W. Carrington, M. A. Pollard and P. W. Beckwith.

LINK-BELT CO., Chicago—A new vibrating screen which recently has been introduced, a new speed reducer, a car spotter and a number of photographs of equipment installed by that company will feature the display. The representatives will be R. J. Heisserman and J. J. Hartley.

LOUDEN MACHINERY CO., Fairfield, Iowa—Industrial monorail material handling equipment including switches hoists, turntables, hoisting elevators, trolleys, as well as traveling cranes will be exhibited by this company. The representatives will be L. F. Berthold, W. J. Schwerman, W. H. Eldridge, Frederick Boehn, P. L. McCain, H. L. Stetser, E. H. Seelbach, J. A. Niles, O. L. Rosenthal, M. A. Spraley, W. L. Walker, L. D. Turner, Walt Baylie, R. H. MacDonald, A. Neher.

LOWE MFG. CO., Detroit—Two electric sand sifting machines will be demonstrated at the booth of this company by R. G. Lowe.

M

C. E. McARTHUR & CO., Chicago—A gagger machine, a rod straightener and shear, and a wire nail straightener and shear will feature the display of this company. The representatives will be C. E. McArthur, C. L. Stewart and Wm. M. Wilson.

J. S. McCORMICK CO., Pittsburgh—Foundry facings, core compounds, supplies and small articles of equipment will constitute the display of this company. J. S. McCormick, H. T. Herr Jr., F. J. Buerger, S. R. Costley, C. C. Bambaugh, W. J. Smith, Harry J. Winters and H. D. Fowler will represent the company.

R. W. McILVAINE CO., Chicago—Photographs will show sand and mold handling equipment manufactured by this company in operation. A portable instrument for determining the relative moisture in molding sand, and a working model of an automatic moisture control which replaces moisture in sand as it returns from the shakeout on a belt conveyor, also will be shown. Representatives will be R. W. McIlvaine, R. L. McIlvaine and Paul Ackerman.

MACLEOD CO., Cincinnati — Operating equipment including a sandblast table, sandblast tumbling barrel, oil burning equipment including a hand pump heater, a compressed air heater, a portable ladle dryer and cupola lighter and blacking sprayers as well as some minor equipment will be shown by this company. The representatives will be Albert A. Moebus, James Lauder and Walter Macleod.

MALLEABLE FITTINGS CO., Branford, Conn.—Variators of various kinds which are manufactured by this company will be shown.

MARSHALL BLOW PIPE CO., Detroit—This company will display a rack type, core baking oven with metal walls and doors encasing four inch insulation. The display will be in charge of the engineering staff of the company.

MATHEWS CONVEYOR CO., Ellwood City, Pa.—A power operated mold conveyor and a roller conveyor designed to handle molds, flasks, and castings, will be demonstrated at the booth of this company. C. A. Adams and J. H. Hough will be in charge of the display.

MATHIESON ALKALI WORKS, INC., New York—The exhibit of this company will consist of a display illustrating the developments in the refining and desulphurizing of cast iron with a cupola flux of its manufacture. The representatives at the convention will be G. S. Evans, H. D. Honan and J. H. Collins.

METAL & THERMIT CORP., New York—Special metals and alloys, and welding compounds will be exhibited by this company.

GEORGE A. FULLER
MRS. GEORGE SCOTT
J. W. COLLINS
GEORGE L. GRIMES
J. W. DOPP
H. P. MACKINNON
E. S. VanDALSON
P. W. MULDER
MRS K. C. BABO
MRS. FRED ERB
E. J. WOODISON

Arthur Braid will be in charge of the display.

MICHIGAN SMELTING & REFINING CO., Detroit—This company's exhibit will consist of ingot brass and bronze, phosphor bronze, die castings, solders, tin, zinc, special alloy ingot, manganese bronze, brass forgings, babbitt metals, copper, lead and aluminum. Representatives will be J. R. Searles, H. Levitt, N. H. Sillman, R. R. Arnold, C. Bloomgarden, P. Gaebelein, R. W. Funk, P. E. Gabriel, Mr. McRae, Mr. Gorman, Mr. Phillips, Mr. Cooke, and Mr. McNamee.

ALEXANDER MILBURN CO., Baltimore—Welding torches, cutting torches, combination cutting and welding torches, acetylene generators, gas, pressure regulators, manifolds, oil burners and preheaters, carbide lights, and paint sprays will be shown by this company. A special torch utilizing oxygen and illuminating gas also will be shown. Representatives will be A. F. Jenkins and C. R. Pollard.

MILLER-HURST CORP., Detroit—Sand and mold handling equipment will be featured at the booth of this company.

H. E. MILLS MFG. CO., Syracuse, N. Y.—This company will display a line of dry core compounds. The representative will be J. R. Webster.

MILWAUKEE FOUNDRY EQUIPMENT CO., Milwaukee—Molding machines including jolt squeezers, jolt squeeze strippers, jolt strippers, jolt draw machines and hand roll-over machines will be shown by this company. A new type of hand-ram-hand-roll-over power draw machine also will be shown. Representatives will be E. J. Byerlein, H. E. Fellows, F. W. Hamel, E. W. Jacobi, C. G. Jurack, L. E. Gregory and T. J. Magnuson.

MODERN POURING DEVICE CO., Port Washington, Wis.—This company will show a line of pouring systems, overhead carrier systems, cranes, trolleys, geared ladles and monorail devices. The company will be represented by Max Goldberg, W. J. Knappe, John Brendel, and Wm. E. Goldberg.

MOLINE IRON WORKS, Moline, Ill.—This company will exhibit its line of squeezer molding machine. The exhibit will be in charge of B. V. Nutt and J. T. Miles.

MONARCH ENGINEERING & MFG. CO., Baltimore—A number of melting furnaces including the oscillating type, the die cast furnace, the dross reclaiming furnace, as well as core ovens, a sand sifter, a ladle heater, a blower, and an oil fired cupola, will be featured at the booth of this company.

MT. JEWETT FIRE CLAY CO., Mt. Jewett, Pa.—

N

NATIONAL ENGINEERING CO., Chicago—This company will show in operation a 6-foot diameter pan mixer with a bucket loader, and a laboratory size sand mixer. Other equipment manufactured by this company also will be shown. Those in attendance will be H. S. Simpson, A. G. J. Rapp, B. Castor, C. D. Hollins, A. C. Christensen, H. N. Schreuder, W. C. Edgar, and C. J. Skeffington.

NEW HAVEN SAND BLAST CO., New Haven, Conn.—Two direct pressure sand blast units, a sand blast barrel, a radial blast barrel, a sand blast table room, and a standard sand blast cabinet will be shown by this company. The representatives will be C. E. Billings, D. S. Sammis, S. S. Parsons, G. C. Fatscher and W. R. Matteson.

NIAGARA CONCRETE MIXER CO., Buffalo

NIAGARA FALLS SMELTING & REFINING CROP., Buffalo—The booth of this company will be fitted as a reception room for the entertainment of convention visitors. Ernest G. Jarvis will be in charge of the booth.

WM. H. NICHOLLS CO., INC., Brooklyn, N. Y.—Various types of combination jolt and power squeezer molding machines and molding units will constitute the display of this company. Representatives in charge of the booth will be Wm. H. Nicholls, Al. V. Magnuson, L. R. Schocken, Chas. Wakefield, Eugene Ballard and Gus Anderson.

NORMA-HOFFMANN BEARINGS CORP., Stamford, Conn.—Precision ball bearings, thrust ball bearings, a precision measuring instrument, special types of roller bearings, and apparatus illustrating the performance of roller bearings under difficult operating conditions will be shown by this company. The exhibit will be in charge of T. J. Harley, C. H. Wallace, R. E. Hecker, C. D. Kilham, and D. E. Batesole.

NORTH AMERICAN MFG. CO., Cleveland—An oil-fired brass melting furnace together with low pressure oil burners, motor-driven blowers and oil burning accessories will constitute the display of this company. R. A. Smart will be in charge of the display.

NORTHERN ENGINEERING WORKS, Detroit—Electric cranes for use in the foundry will be shown by this company.

NORTON CO., Worcester, Mass.—This company will exhibit special grinding wheels, refractory ware, grinding machines and special

floors. The representatives will be Herbert Duckworth, C. W. Jinnette and A. G. Green.

O

S. OBERMAYER CO., Chicago—A line of foundry supplies will be exhibited by this company.

OILESS CORE BINDER CO., Cleveland—This company will show samples of its core binder and core paste as well as castings and cores made using their product. J. A. Hamilton, H. A. Baker and H. B. Fischer will be in charge of the exhibit.

O. K. TOOL CO., Shelton, Conn.—Numerous types of hand tools will be shown by this company.

OLIVER MACHINERY CO., Grand Rapids, Mich.—This company will show a band saw, jig saw, lathe equipped with controller mounted directly on the motor, three speed horizontal boring machine, power feed mortiser, and single spindle shaper. In addition the company will show several types of saw benches, a surface planer, hand planer, jointer, lathe, disk sander, spindle sander, boring machine, and electric band saw brazer. The company will be represented by A. S. Kurkjian, J. E. McLauchlen, J. E. Duthie, C. A. Ginter, and G. W. Crosley.

OSBORN MFG. CO., Cleveland—This company will have in operation a jolt squeeze stripper machine, jolt stripper machine, jolt rollover pattern draw machine, several jolt squeezer molding machines, and two plain jolt molding machines. Representatives will be F. G. Smith, E. S. Carman, M. W. Zemah, E. T. Doddridge, J. C. Alberts, F. T. Spikerman, R. E. Kiefer, H. B. Klar, G. G. Adam, R. W. Hisey, J. D. Wise, E. F. Oyster, G. A. Sawitzke, J. F. Howard, Ward Dougherty, R. C. Miller.

OXWELD ACETYLENE CO., New York—This company will show welding apparatus and supplies as well as oxygen and acetylene cylinders.

P

PANGBORN CORP., Hagerstown, Md.—Sandblast and dust arrester equipment including sandblast room, cabinets, barrels, revolving tables, etc. and moisture and oil separators for eliminating moisture in compressed air lines will be shown by this company. A special device for loading barrels also will be demonstrated. The representatives will be Thomas W. Pangborn, John C. Pangborn, H. D. Gates, P. J. Potter, F. J. Hull, W. A. Rosenberger, W. C. Lytle, C. T. Bird, J. J. Carr, Fred E. Wolf, E. C. Gilmour, W. T. Randall, J. J. Bowen, George A. Cooley, L. W. Wagner, and L. E. Nelson.

PATENT CEREALS CO., Geneva, N. Y.—Core and facing binders will be on display and cores, samples of core mixtures, pictures of large castings made with this binder etc. will be shown. The display will be in charge of A. N. Duncan and T. K. Fahy.

PEERLESS SAND CO., Conneaut, O.—This company will show various grades of sand for use from the small brass and aluminum castings to heavy gray iron and steel work. The representatives will be F. L. Moore, C. E. Moore and C. M. Bixler.

PENTON PUBLISHING CO., Cleveland—The booth of this company will be fitted up as a rest room where those in attendance at the convention are invited to make their headquarters. The representatives will be John A. Penton, Charles J. Stark, H. Cole Estep, J. D. Pease, F. V. Cole, E. L. Shaner, Dan M. Avey, Pat Dwyer, Frank G. Steinebach, Charles Vickers, Edwin Bremer, R. T. Mason, W. W. Maloney, G. B. Howarth, J. H. Ahrens, A. L. Klingman, L. C. Pelott, S. H. Jasper and V. E. Dolan.

GEO. W. PERKS & CO., Akron, O.—This company will show safety flanges for use with emery wheels.

CHARLES PETTINOS, New York—Molding sands and foundry supplies will be shown at the booth of this company.

GEORGE F. PETTINOS & CO., Philadelphia—This company will show a sample line of its products. The following representatives will be present: E. G. Stratton, M. J. Fitzgerald, D. S. Yeomans, J. H. Hatten, T. H. Walker, F. H. Goodfellow, J. W. Owings and George F. Pettinos.

PICKANDS, BROWN & CO., Chicago—Foundry coke will be exhibited at the booth of this company.

PITTSBURGH ELECTRIC FURNACE CORP., Pittsburgh—This company will have an electric furnace in continuous operation melting gray iron which will be poured into permanent molds displayed by the Holley Carburetor Co. In addition this company will show a small 50-pound ladle type electric furnace which is designed for use in colleges and universities and where special analysis melts for research work on irons, steels and numerous alloys are required. A power demand limitator also will be exhibited. The representatives will be W. B. Wallis, H. E. Bromer, W. E. Moore, G. L. Simpson, W. H. Payne, W. E. Lewis, F. E. Gibson, M. A. Beltaire, Presley Hamilton, Alexander Haigh, A. A. Morton, W. L. Kammerer and R. D. Thomas.

PORTAGE SILICA CO., Youngstown, O.—This company will exhibit steel molding, core and sand blast sands, as well as silica rock in its natural state. The representatives will be E. E. Klooz and Lee R. Farrell.

PORTER-CABLE MACHINE CO., Syracuse, N. Y.—Portable motor driven sander and grinder, a portable motor driven sander, a motor driven belt sander and grinder, portable surfacing machine and a universal milling attachment will be shown by this company. The

P. J. McMANUS
MRS. WARNER THOMPSON
C. W. JINNETTE
MRS. H. RYPSAM
MRS. J. C. WOODISON
M. T. MORTENSEN
C. M. CULVER
MRS. ROBERT CRAWFORD
H. B SWAN
MISS HELEN CRAWFORD
ROBERT B. CRAWFORD
J. C. WOODISON

machines will be in operation and demonstrated by D. J. Ridings.

PRODUCTION EQUIPMENT CO., Cleveland—This company will exhibit its line of sand cutting machines.

Q

QUIGLEY FURNACE SPECIALTIES CO., New York—This company will demonstrate high temperature cement for laying up fire brick and making plastic refractory mixtures from crushed old fire brick, as well as solutions to prevent corrosion of iron, steel and other metals, waterproof and protect surfaces of concrete, stone, cork, wood, etc. D. F. McMahon and H. M. Thompson will be in charge of the display.

R

RACINE TOOL & MACHINE CO., Racine, Wis.—Woodworking machine tools will be shown at the booth of this company.

REEVES PULLEY CO., Columbus, Ind.—Numerous types of pulleys will constitute the display of this company.

RICHARDS-WILCOX MFG. CO., Aurora, Ill.—Track equipment including the trolley type and I-Beam type switches, turntables and other equipment for overhead conveying systems will be shown by this company. A ball bearing I-beam trolley will also be on display. The exhibit will be in charge of the following: H. R. Butler, E. F. Brumbaum, E. J. G. Phillips, and A. J. Eggleston.

ROBESON PROCESS CO., New York—Core binders manufactured by this company and cores made from this type of binder will be shown.

WM. C. ROBINSON & SON CO., Baltimore—A line of core oils will be displayed by this company. Joseph P. Kennedy, H. E. Washburn and O. J. Vogt will represent the firm.

ROGERS BROWN & CROCKER BROS., INC., New York—Pig iron, coke, molding sand, ferromanganese, ferrophosphorus, aluminum, etc., will be shown by this company.

ROHRBACHER SHOE CO., Boston—Special shoes for the worker in the foundry will be exhibited by this company. A. L. Rohrbacher Jr., F. H. Rohrbacher, D. M. Hall and G. A. Moore will represent the company.

ROLLWAY BEARING CO., INC., Syracuse, N. Y.—Shaft bearings, crane hook bearings, bearings for crane motors, bearings for sand machinery, and core oven cars and conveyors will be displayed by this company. The representatives will be E. J. Lybert and Samuel Farrell.

ROSS-TACONY CRUCIBLE CO., Tacony, Philadelphia—Crucibles for melting steel and various nonferrous metals together with graphite stopper heads for pouring steel will be exhibited by this company. The representatives will be C. S. Orne Jr., I. R. Robinson, Wm. C. Yenger and Charles C. Bacon.

ROYER FOUNDRY & MACHINE CO., Wilkes-Barre, Pa.—Various models of a sand separator and blender in operation will be shown by this company. G. F. Royer and John Lloyd will represent the company.

ROYERSFORD FOUNDRY & MACHINE CO., INC., Royersford, Pa.—A roller bearing tumbling mill, a full line of shaft hangers, pillow blocks, couplings, and collars, drill presses and grinders will be shown by this company which will be represented by F. H. Deisher, M. G. Sperzel and E. H. Neely.

RUEMELIN MFG. CO., Minneapolis—Sandblast cabinets with plain and revolving tables, sandblast curtains, generators, guns, sand sifters, various types of exhaust fans and dust collectors will be shown by this company.

S

SABIN MACHINE CO., Cleveland—A one-man barrel truck of special design will be exhibited by this company.

SAFETY EMERY WHEEL CO., Springfield, O.—Special motor driven floor grinders, standard motor driven floor grinders, portable grinders, together with a line of grinding wheels adapted for foundry use will be shown by this company which will be represented by H. G. Bennett, F. T. Wisner, W. H. Vance, C. W. Gwyn, and H. G. Weinland.

SCHMITZ CO., Rock Island, Ill.—

SEMET-SOLVAY CO., Detroit—This company will feature its line of foundry coke.

SHEPARD ELECTRIC CRANE & HOIST CO., Montour Falls, N. Y.—This company will show a cupola charging hoist of 3 tons capacity in operation lowering charges in a dummy cupola with bottom dump buckets, an umbrella type charging bucket and a special hoist of close clearance design. A photograph showing equipment in service in the foundry yard also will be on display. Representatives will be James A. Shepard, F. A. Hatch, R. H. McGredy, Frank G. Cornell, R. T. Turner, G. L. Drake, W. B. Briggs, G. G. Robbins, J. D. Gillette, W. C. Minier, and H. D. Crout.

SIMONS PAINT SPRAY BRUSH CO., Dayton, O.—This company will exhibit a new air brush for spraying paint and other liquids, as well as a portable air compressor for supplying the necessary air to operate the spray brush. The display will be in charge of Geo. W. Simons.

SKEPPSTEDT-ERICKSON CO., Moline, Ill.—Multiple core machines in operation and an adjustable core bench will be shown by this company as well as sample cores and castings that have been produced with this type of equipment. The company will be represented by O. Skeppstedt and E. G. Erickson.

SKYBRYTE CO., Cleveland—A liquid window cleaner will be shown and demonstrated by this company.

W. W. SLY MFG. CO., Cleveland—Sandblast mills, a complete sandblast room with turntable, a tumbling mill, a model dust arrester, a pressure type rotary table complete with separator and elevator and a complete steel molding sand reclaiming installation will be in operation at the booth of this company. The representatives will be C. P. Guion, R. O. Mullen, D. P. Carter, D. L. Harris, W. L. Kammerer, R. W. Hasselle, L. B. Brewster, H. C. Nicholas, G. A. Boesger, F. A. Ebeling and S. C. Vessy.

SMITH OIL & REFINING CO., Rockford, Ill.—The line of core oils manufactured by this company will be displayed at its booth.

SMITH-MONROE CO., South Bend, Ind.—This company will exhibit a pressed air separator for separating oil and water from the individual compressed air lines. This company will be represented by L. R. Smith, R. O. Monroe and C. J. Scribner, A. F. Squier and O. J. Lynch.

WERNER G. SMITH CO., Cleveland—This company will exhibit samples of core oils and specimen cores made by these oils in various foundries. The company will be represented by Werner G. Smith, Milton Finley, N. A. Boyle, Frank H. Dodge, William Rayel I. M. Gerteis, George H. Graham, L. P. Robinson, George Furman, John M. Glass, W. W. Werckman, and Louis F. Ferster.

SPENCER TURBINE CO., Hartford, Conn.—Turbo compressors for use in supplying air for foundry cupolas, oil and gas burning industrial furnaces, etc., will be shown by this company. The display will be in charge of S. E. Phillips, H. M. Grossman, R. B. Richardson, and O. J. Dingee.

THE SPRINGFIELD ALUMINUM PLATE & CASTINGS CO., Springfield, O.—Aluminum castings, match plates and aluminum specialties will be shown at the booth of this company which will be in charge of E. A. Parker and W. H. Parker.

STANDARD SAND & MACHINE CO., Cleveland—This company will exhibit a batch mixer which will handle about 5 tons per hour, a batch mixer with revolving screens equipped with direct motor drives and other sand preparing equipment. The company will be represented by Harry E. Boughton, B. W. Roberts and P. E. Lacey.

STANDARD SILICA CO., Chicago.—This company will show samples of its line of core sands and will make and bake cores. A. C. Goodnow, F. D. Chadwick, and R. W. McCandlish are the representatives.

STERLING WHEELBARROW CO., Milwaukee, Wis.—This display will consist of rolled steel foundry flasks, wheelbarrows, trucks and foundry specialties. The representatives will be H. H. Baker, Geo. H. Lambkin, L. P. Robinson, J. M. Dickson, H. J. Felsburg, J. J. Coyne, O. E. Steep, L. E. Washer and J. A. Patterson.

FREDERIC B. STEVENS, INC., Detroit—The booth of this company will be fitted up as a rest room for the reception of visitors and the products of its foundry facing mill will be shown The representatives of the company will be Frederic B. Stevens, W. H. Jos. Cluff, John M. Mayers, Lewis H. Kirby, and the salesmen of the company.

STONEY FOUNDRY ENGINEERING & EQUIPMENT CO., Cleveland—This company will display shake-out bails, vibrator, shake-out equipment for knock-out machine and a vibrator molding machine. The company will be represented by John T. Stoney, E. S. Cohen, Joe Soukup, Geo. A. Scott and L. J. Reinhard.

SUGAR PINE SALES CO., San Francisco—This company will show pieces of sugar pine, patterns made from this type of lumber, and a patternmakers' work bench containing a number of patternmakers' tools.

SULLIVAN MACHINERY CO., Chicago—This company will have a compound air compressor direct connected to a motor to assist in supplying compressed air for the exhibitors at the show. They also will show a small straight line air compressor, a portable grinder, a portable hoist or car puller and other pneumatic tools. The representatives will be Jos. H. Brown, W. H. Duffill, H. M. Stark and R. B. Hosken.

SUNDSTRAND MACHINE TOOL CO., Rockford, Ill.—This company will show in operation a lathe and a milling machine. The representatives will be E. W. Scheels, H. Kent, D. B. Burleigh, C. B. DeVlieg and G. A. Markuson.

SUPERIOR SAND CO., Cleveland—Samples of molding sands for brass, aluminum, gray and malleable iron and semi-steel castings will be shown by this company. The representatives will be C. D. Pinkerton and H. C. Koontz.

SUPERIOR SIZING CO., INC., Lockport, N. Y.—This company will exhibit core oils, parting compounds, and core wash. The representatives will be R. M. Snell, E. J. Johnstone, F. J. MacMullin, F. A. Roehlk, and J. E. Kershaw.

SWAN-FINCH OIL CORP., Chicago—Samples of a line of core oils manufactured by this company will be exhibited.

SWARTWOUT CO., Cleveland—This company will exhibit a metal insulated drawer type oven as well as a full section of a lift door type metal insulated oven including the lift door, the structural frame required for it and all lifting mechanism. The company also will show a rotary ball bearing ventilator. The representatives will be Carl F. Mayer and L. P. Russon.

T

TABOR MFG. CO., Philadelphia—A complete line of foundry molding machines, including several new types will be shown at the booth of this company which will be in charge of Wilfred Lewis, F. R. Wallace, Robert M. Maull, J. T. Ramsden, P. J. Shire, Wm. E. Sewell, Jas. H. Coleman, H. W. Impey, T. L. Sumner, John Pfendner, and R. Wieshner.

TAYLOR INSTRUMENT CO., Rochester, N. Y.—Thermometers of all kinds, pyrometers and temperature recording and regulating devices will be shown by this comapny.

TESSMER MACHINE & TOOL CO., Detroit—Power sprue cutters, sand riddles, tumbling barrels, molding benches, vibrators, knee valves, flask clamps, blow valves and pneumatic shakers will be shown by this company which will be represented by F. P. Tessmer and G. S. Brennan.

WARNER R. THOMPSON CO., Detroit—This company will exhibit samples of molding and core sand, and will be represented by Warner R. Thompson, W. Edward Thompson, Fred A. Cowen and Frank N. Beasaw.

TIONA PETROLEUM CO., Philadelphia—This company will show its line of core oils.

TRANSMISSION BALL BEARING CO., INC., Buffalo—This company will show a swing frame grinder in operation as well as a line of ball bearings including the dust-proof dumb-bell type pillow block. Single row ball bearings and fitted loose pulleys also will be shown.

TRUSCON STEEL CO., Youngstown, O.—Steel foundry flasks, bottomboards, core plates, core racks, mold jackets, snap flask bands, alloy steel platforms and boxes and material handling equipment will constitute the display of this company. The following representatives will be present: George F. Sparks, N. C. Ferreri, P. A. Nuttall, W. H. Price, George Madden, J. C. Pierce Jr., H. W. Jencks, C. H. Watt, A. L. Abrahams, A. W. Ferguson, L. S. Todd, and F. J. Vlaskamp.

W. S. TYLER CO., Cleveland—An electric screen for riddling used foundry sand, a testing sieve shaker, a standard screen scale sieve, and complete samples of woven wire cloth in various meshes, metals and weaves will be shown by this company. Representatives will be Neil E. Kile, Hugh F. Pierson and M. D. Pugh.

U

UNION METAL MFG. CO., Canton, O.—Pressed steel flasks, pressed steel bottom boards and pressed steel core plates will be shown by this company. The booth will be in charge of Edwin L. Grimes.

UNITED COMPOUND CO., Buffalo—Vent wax in various sizes together with cores illustrating its use will be shown at the booth of this company which will be in charge of Wm. F. Bradley and L. F. Leney.

UNITED STATES ELECTRICAL TOOL CO., Cincinnati—This company will show ball bearing grinders for light and heavy duty, and heavy duty adjustable speed grinders which maintain constant peripheral speed. The exhibit will be in charge of Matt J. Herold.

UNITED STATES GRAPHITE CO., Saginaw, Mich.—This exhibit will consist of various grades of plumbago for facing and core wash and other graphite products. The company will be represented by A. J. Heindel, G. D. Robinson, R. J. Edmiston, C. H. Schenck and R. A. Corrigan.

UNITED STATES SILICA CO., Chicago—This company will show the work of its sand blast abrasives through motion pictures, and will exhibit samples of the abrasive and castings cleaned with that abrasive. The booth will be in charge of Volney Foster, H. F. Goebig and O. M. Olsen.

W

WADKIN & CO., Leicester, England—This company will exhibit a line of woodworking machinery including a semiautomatic universal wood milling machine and a mechanical woodworker. The following will be in attendance at the booth of the company; J. H. Goddard, A. Priestnall and F. Conibear.

WADSWORTH CORE MACHINE & EQUIPMENT CO., Akron, O.—Standard line of coremaking machines, core plates and bottomboards will be shown by this company. Representatives will be George H. Wadsworth and M. C. Sammons.

J. D. WALLACE & CO., New York—Portable woodworking machines including the new universal saw, and a hand saw will be displayed at the booth of this company. The representatives in charge will be H. L. Ramsay, M. A. Cole, A. Armstrong.

WARNER & SWASEY CO., Cleveland—Grinders equipped with governors, pneumatic drills which recently have been placed on the market, a right angle drive grinder to which abrasive disks may be attached easily, and a display of the various parts of the grinders will be shown at the booth of this company. C. J. Stillwell, C. S. Stillwell, Karl Pohlman and C. W. Campbell will be in charge of the booth.

JERVIS B. WEBB CO., Detroit—A mold conveyor and an overhead continuous trolley conveyor system for handling castings will be shown in operation at the booth of this company. Steel I-beam trolley for handling small ladles also will be exhibited. The representative will be Geo. R. Melville.

WELDIT ACETYLENE CO., Detroit—Welding and cutting apparatus, rods and wire will be shown at the booth of this company.

WESTINGHOUSE ELECTRIC & MFG. CO., East Pittsburgh, Pa.—Electric Motors for use in the foundry will feature the exhibit of this company. Other electrical devices including a glue pot and space heater also will be shown.

WESTINGHOUSE TRACTION BRAKE CO., Pittsburgh—A motor driven air compressor with automatic control and with electric lights installed under glass covers on the side, top and back to permit observation when in operation or when idle; a storage air reservoir; air operating valves and a hydraulic press for straightening small castings will be shown by this company. The representatives will be J. F. Ames, M. H. Burchard, S. A. King, C. E. Smith, R. G. Justus, F. C. Young, S. B. Schrontz, W. C. Burriss, Lawrence Wilcox and W. M. Bisel.

WHITEHEAD BROTHERS CO., Buffalo—Foundry sands, clays, gravels, foundry facings, core binders and supplies will be shown by this company. The representatives will be A. J. Miller, J. H. Whitehead, V. L. Whitehead Jr., C. E. Andrews, H. B. Hanley, A. Y. Gregory, F. B. Clark, R. L. Carpenter, T. F. Hogan, H. J. Gerrard, H. S. Depew, A. W. Jacus and A. J. McBride.

WHITING CORP., Harvey, Ill.—Photographs, drawings and miscellaneous equipment will be shown at the booth of this company which will be in charge of T. S. Hammond, J. H. Whiting, A. H. McDougall, N. S. Lawrence, G. P. Fisher, A. J. Grindle, R. E. Prussing and various district managers.

G. H. WILLIAMS CO., Erie, Pa.—This exhibit will consist of a ¾-cubic yard clam shell bucket, working models of this bucket and a two-line bucket, and motion pictures of the clam shell bucket in service. The company will be represented by C. D. Buoy, T. D. Harter and G. F. Thompson.

E. J. WOODISON CO., Detroit—Foundry supplies, and equipment and polishing and platers supplies will be shown by this company. Several improvements in core oven equipment will be displayed for the first time. The representatives will be E. J. Woodison, J. C. Woodison, Geo. A. Burman, R. S. Hoffman, B. E. Beldin, H. T. Taylor, M. E. Nordham, E. C. Sheafer, A. J. Becker, C. H. Woodison, C. D. Yahne, W. J. Wark, L. A. Dawson, F. H. Shortsleeves, J. F. Webb, W. F. Haggman and R. M. Buckingham.

WORTHINGTON PUMP & MACHINERY CORP., New York—This company will exhibit a new type of air compressor with a direct connected synchronous motor which is started by a push button control.

Y

YALE & TOWNE MFG. CO., Stamford, Conn.—This company will show an overhead single I-beam crane and an electric chain hoist ,equipped with a two-speed controller designed specially for foundry service. Electric industrial trucks of the elevating platform type, and cut-open models of the drive unit of the truck and electric hoist together with several hand blocks will be shown. The company will be represented by H. J. Fuller, Maxwell C. Maxwell, H. J. Dorus, F. A. Dewey, and Mr. Fairchild.

YOUNG BROS. CO., Detroit—A large mold oven will form the booth and within this oven will be shown smaller core ovens, operating models of continuous conveyor ovens, photographs, films, blueprints, sample cores, oven accessories and construction details. The representatives of the company will be Geo. A. Young, Robt. B. Reed, V. A. Box, G. I. Thatcher, P. A. Meyer, C. G. Lisch, H. M. White, C. W. Mullenhagen, T. P. McVicker, F. F. Gardiner and G. G. Parry.

Bearings Are Too Hard

Question: We are making a small engine base in which the bearings have to be machined to take a die cast lining. We find the bearings so hard that we cannot machine them except by grinding. The average thickness of metal in the casting is 5/16-inch. The iron mixture is made up of pig iron 50 per cent, cast scrap 30 per cent, steel scrap 20 per cent. Analysis of the pig iron is: Silicon 2.51 per cent, sulphur 0.03 per cent, manganese 0.72 per cent, phosphorus 0.165 per cent.

Answer: Assuming that the iron scrap in the charge carries a maximum of 2.50 per cent silicon, the silicon in the casting made from your mixture will only amount to 1.75 per cent and that is too low for a casting with a 5/16-inch thickness of metal. Obviously, unless local conditions are prohibitive, the remedy for the condition is to increase the silicon either by the addition of silvery iron to the charge, or by adding ferrosilicon either in the cupola or in the ladle. If you are forced to continue using the present mixture the castings may be softened by raising them to a red heat and then covering them with ashes or dried sand and allowing them to cool very slowly.

Hot Blast Cupola Operates in Car Wheel Shop

By Pat Dwyer

¶ Preheated Air Effects Economy In Continuous and Stringent Service

Fig. 1—Wheel molds on a 30-car conveyor are poured from bottom-poured ladles at a point nearly in front of the 15-ton mixing ladle

AT ONE time or another probably every foundryman responsible for results either to himself or to an employer, has stood on the cupola charging deck watching the flame go roaring up the stack and wondering why the same flame could not be harnessed in some manner and utilized instead of going to waste. Usually his interest ceased at the wondering stage. He reflected that the present cupola melting process was fairly satisfactory. It was the cheapest and most convenient method known for melting iron for foundry use and although a few changes had been made during the past 100 years, the fundamental principles and method of operation remained practically the same.

A brief review of the process shows that originally the fuel and iron in the charge were thrown into the cupola indiscriminately without any reference to definite layers. Without attempting to detract in any manner from the efficacy of present methods it may not be out of place to refer to the many excellent qualities of the iron melted according to the foregoing method. This method was in universal use up to 100 years ago. It continued to be practiced quite extensively up to within the memory of many foundrymen who still are active and occasionally a case is heard of at the present day where the method is carried on in some little back water eddy unaffected by a rush of the modern industrial stream.

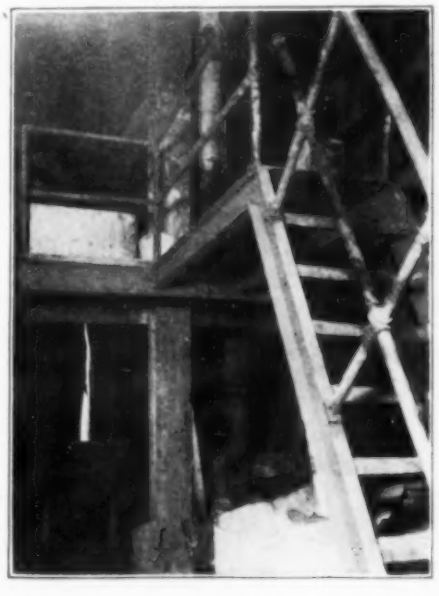


FIG. 2—THE CUPOLA IS SLAGGED THROUGH THE SPOUT. THE SLAG IS DEFLECTED BY A DAM IN THE SPOUT AND FLOWS OVER ONE SIDE AND THENCE THROUGH A HOLE IN THE PLATFORM INTO A SLAG POT MOUNTED ON WHEELS

The first radical change dealt with the method of placing the charges of iron and fuel in definite layers. Heretofore the service of a highly experienced man was required to gage the correct relationship of the materials. Placed on a definite basis the work might be entrusted to less skilled helpers. About the same time the drop bottom type of cupola was introduced. Solid bottom cupolas still are used to some extent in foreign countries, but the drop bottom type is universal in America.

Commencing with a single or at most a pair of tuyeres, a great many modifications of the original model have been tried in the evolutionary period which began with the use of charcoal, turned to anthracite coal and ended with the use of coke. Object of every tuyere designer has been a device to insure a maximum consumption of air in a minimum time and with the air distributed in such a

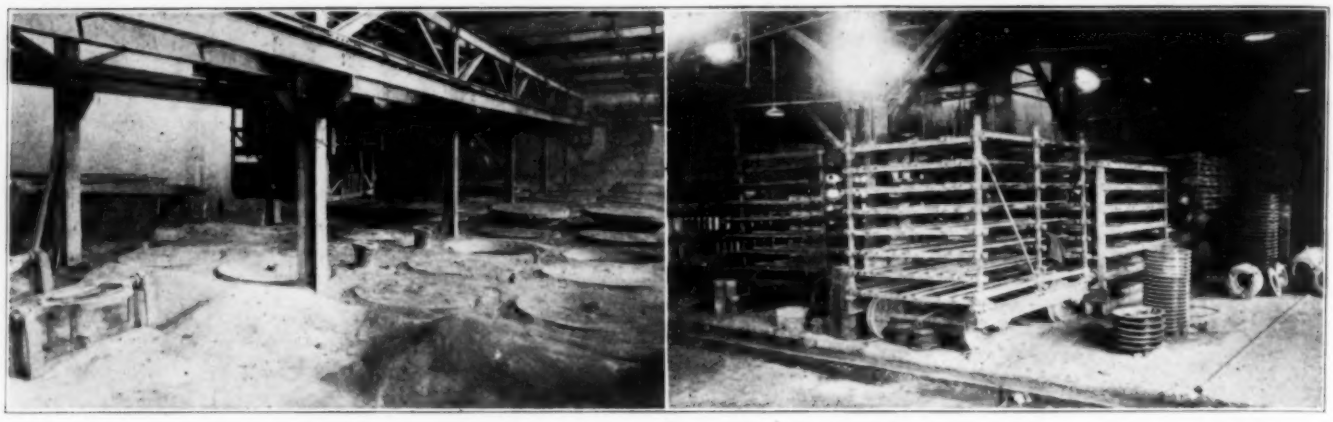


FIG. 3—BATTERY OF ANNEALING PITS ARE SERVED BY TWO CRANES AND HAVE A COMBINED CAPACITY OF 750 WHEELS. FIG. 4—EACH PAN CORE IS MADE AND DRIED IN AN INDIVIDUAL FORMER. WITH A TRANSFER CAR THE LOADED RACKS MAY BE SHIFTED FROM ONE OVEN TO ANOTHER AT WILL

manner that all the available coke came into contact with it.

Experiments have been tried with tuyeres of almost every conceivable shape, number and capacity. Air has been blown straight in, up, down and at a tangent. Correct pressure and volume of blast still are in the debatable stage and form live subjects for discussion wherever foundrymen gather together to exchange views on the technical phases of the industry.

The late Thomas D. West built a center blast cupola to confirm a theory he held in regard to the manner in which a great deal of the blast was wasted in the ordinary type of cupola with a ring of horizontal tuyeres a certain distance from the bottom. He claimed to have proved his contention, but unfortunately the center tuyere was knocked to pieces in operation and had to be abandoned as impractical.

Used Oval Shaped Lining

Other more or less prominent attempts to improve on the usual type of circular cupola are found in the McKenzie type of cupola and in another model whose parentage is claimed by several foundrymen. In the McKenzie cupola the lining and shell are oval instead of circular on the theory that the blast from the tuyeres on the two long sides of the oval will penetrate closer to the center than in a circular cupola of the same cross sectional area. In the second style of cupola mentioned, small perforations were scattered over the lining from the tuyeres almost to the charging door level. Suitable piping connected these perforations with the windbox or with an auxiliary air line. The result in effect was to convert the entire lining of the cupola into a magnified tuyere. Proponents of the idea claimed a great acceleration in the melting speed, an absolutely clean drop and a reduction in the ratio of coke to iron.

For reasons which do not affect the present discussion neither of the foregoing types of cupola was adopted to any extent. The same is true of the exceedingly high cupola tried at various times with the idea of utilizing all the heat of the blast in pre-

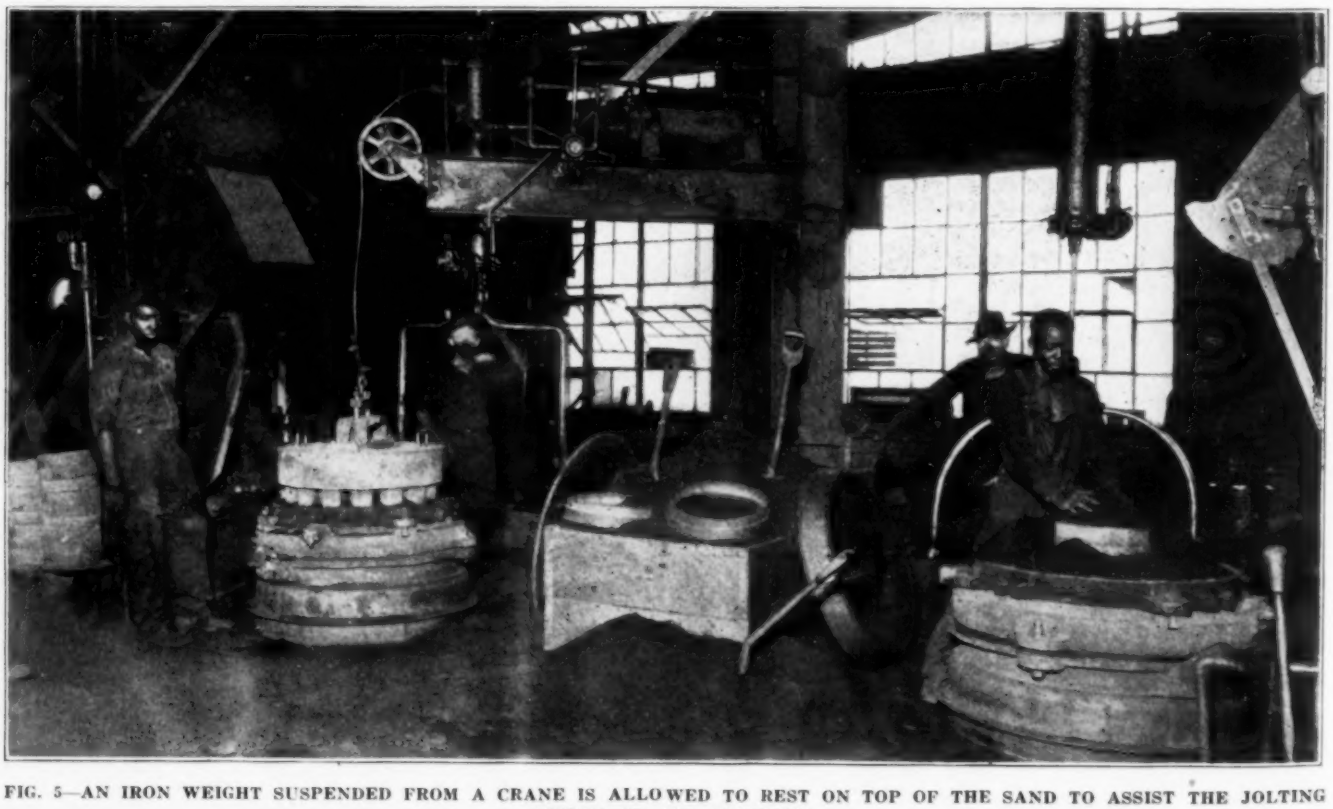


FIG. 5—AN IRON WEIGHT SUSPENDED FROM A CRANE IS ALLOWED TO REST ON TOP OF THE SAND TO ASSIST THE JOLTING ACTION OF THE MACHINE

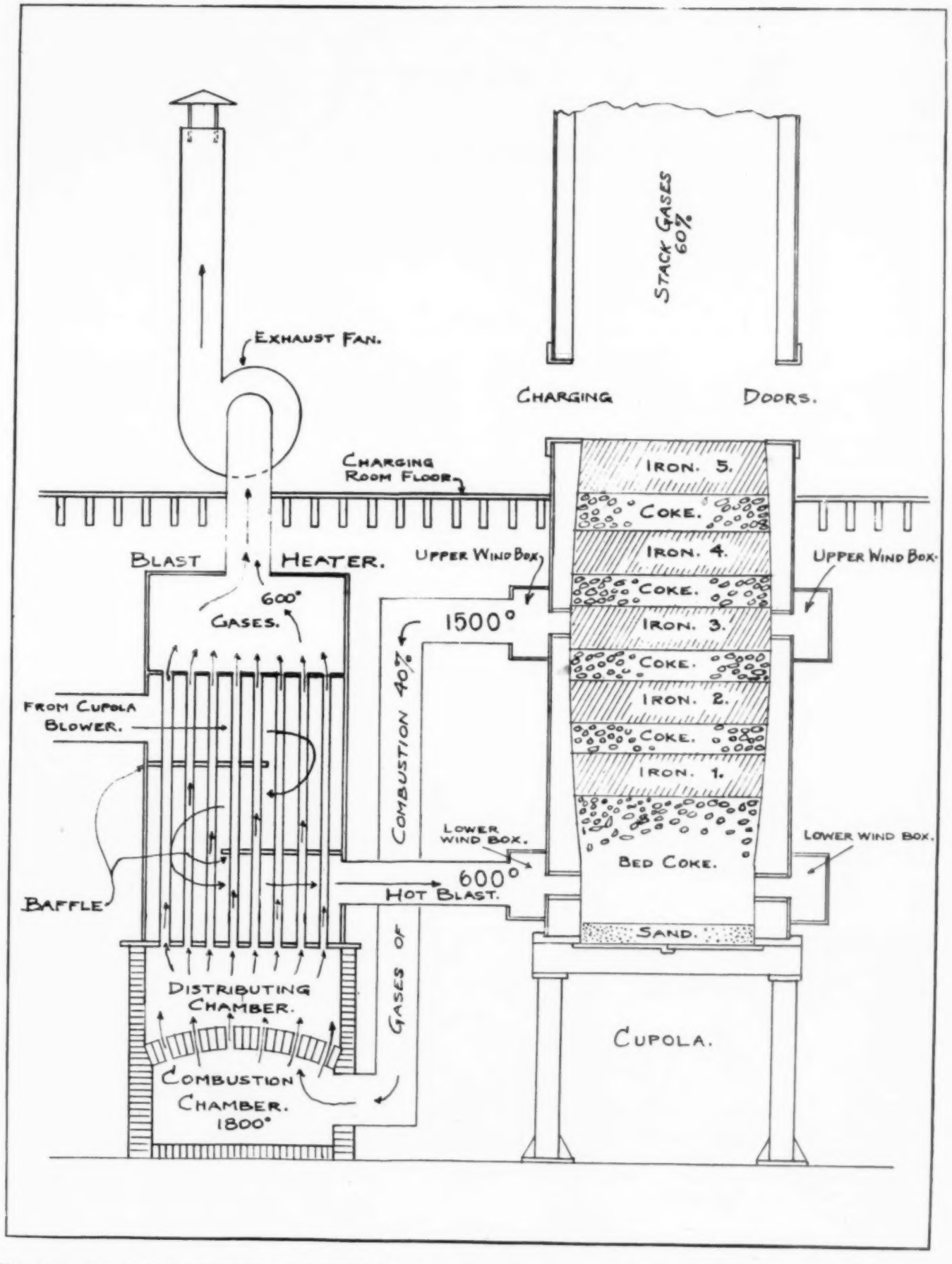


FIG. 6—SECTIONAL VIEW OF CUPOLA AND PREHEATING DEVICE SHOWING DETAIL OF PREHEATING CHAMBER WITH ARROWS INDICATING DIRECTION OF BLAST IN ITS PASSAGE FROM THE BLOWER TO THE CUPOLA—AN EXHAUST FAN PULLS THE HEATED GAS FROM THE CUPOLA THROUGH A CHAMBER PROVIDED WITH A GREAT NUMBER OF CAST IRON TUBES—THE BLAST IS HEATED ON THE SAME PRINCIPLE AS WATER IN A STEAM BOILER

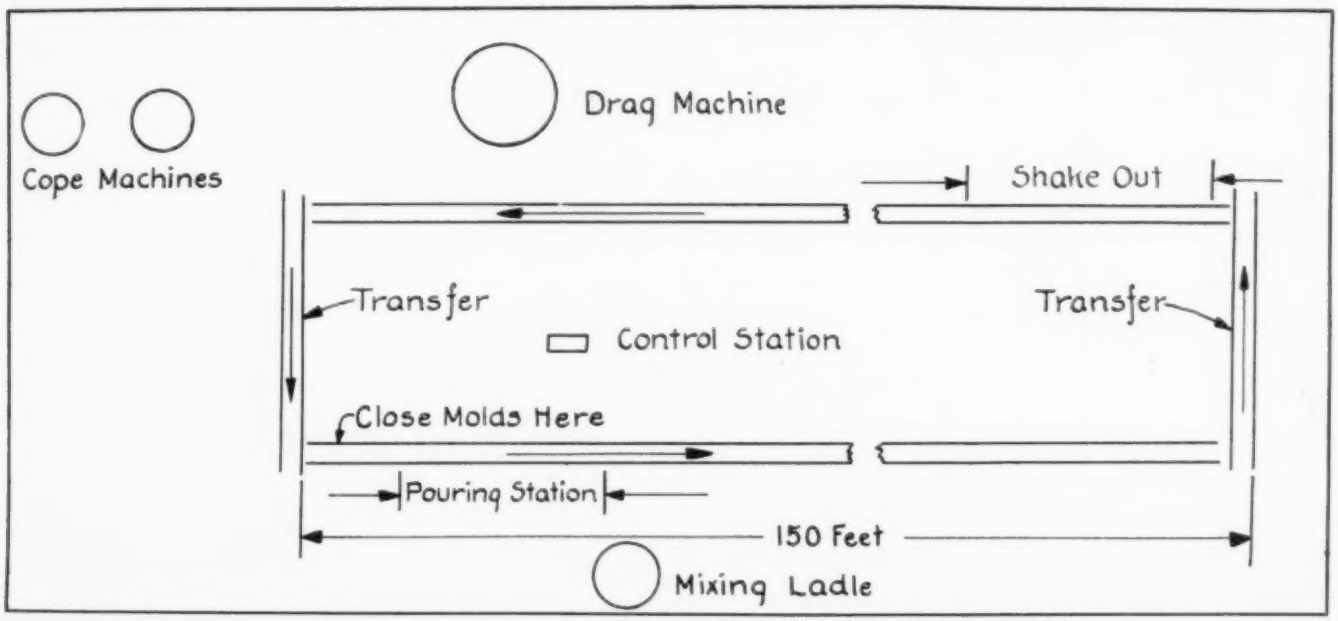


FIG. 7—INFORMAL SKETCH NOT DRAWN TO SCALE SHOWING THE GENERAL LAYOUT OF THE WHEEL MAKING INSTALLATION

heating the charges. Theoretically the idea seemed to have merit, but in actual practice it was found that above a certain point, depending to some extent on the diameter of the cupola and the relative weight of the charges, the heating effect was negligible.

All the foregoing attempts and others not enumerated were familiar to the engineers of the Griffin Wheel Co., Chicago, when they set about the problem of applying a heated blast to the cupola. The problem hinged on utilizing the heated gas, the carbon monoxide *CO* and the unconsumed carbon dioxide CO_2 going to waste above the melting zone, to heat the cold blast entering the tuyeres.

In the first attempt a German process was tried out at one of the Chicago plants of the company. This method was described in THE FOUNDRY Dec. 15, 1923. After a trial it was abandoned for an improved method which now has been in successful operation for over a year in the two Chicago plants and for which patents now are pending. With slight modifications the method recently has been applied to the company's cupola in Detroit and eventually will be installed in other foundries of the company operated in Council Bluffs, Ia., Los Angeles, Kansas City, Boston, St. Louis, St. Paul, Tacoma, Wash., and Salt Lake City, Utah. The capacities of these various foundries range from 300 to 1700 car wheels per day.

Briefly the method may be described as follows:

The heated and unconsumed gas is drawn from the cupola through a ring of tuyeres located 2 feet below the charging door level. This gas is burned with the addition of a little free air under an insulated steel plate chamber containing a number of vertical cast iron tubes. The flame travels through these tubes and heats the cold blast which enters through a suitable opening and circulates among the tubes. The heated blast leaves the chamber and is conveyed through a suitable pipe to a bustle pipe surrounding the cupola which supplies a row of pendant tuyeres in the usual manner. The tubes become heated to a temperature of approximately 1000 degrees Fahr. and the blast enters the cupola at a temperature of between 400 and 500 degrees Fahr. The heated gas passes into a chamber above the tubes and then passes out through

FIG. 8—AT THIS END OF THE CONVEYOR THE CARS ARE SHIFTED FROM LEFT TO RIGHT AND RETURN TOWARD THE MOLDING STATION

a small stack provided for the purpose.

The net result to date is an approximate saving of 25 per cent in coke. The melting speed has been accelerated to an extent beyond the capacity of the molding floor to absorb. Consequently the blast pressure has been reduced from 12 to 6 ounces with a corresponding decrease in the power required to operate the blower. Formerly the charges were made up of 10,000 pounds of iron to 1200 pounds of coke. At present the cupola is operating on 12,000 pound iron charges and 1000 pound splits of coke.

Under the A. R. A. specifications chilled iron wheels are subjected to unusually severe tests involving chill measurements, impacts in a drop test, and thermal expansion, all of which require the metal from which the wheels are cast to be of highest grade and absolutely uniform from the beginning of the first tap to the end of the last tap. The art of melting is so perfected that there is no fluctuation of the metal from hour to hour which will affect the chill on the test piece. Any oxidation above normal is disastrous. The hot blast cupola meets all the requirements for regularity, low oxidation, temperature of the metal, etc., on account of the added features of control.

The cupola with a 90-inch shell lined to 72 inches, also the recently installed skip hoist by which it is charged mechanically were described at length in THE FOUNDRY, Aug. 1, 1926. One man attends to all the work on the charging floor. Five men in the stockyard, one man on the gantry crane who loads the charging cars with a magnet and one man on the scrap breaker take care of a daily heat of 160 tons. The crane man also unloads all the incoming raw materials and the man on the scrap breaker is available for other duties a considerable part of the time.

Blast is on the cupola for about 8 hours daily and the charges are kept level with the door until the entire amount has been placed. Readings taken at various times during the progress of the heat show a temperature of about 100 degrees Fahr. in the vicinity of the charging door. Gas analyses taken at the same point indicate that practically no unconsumed carbon monoxide gas passes the row of intake tuyeres which convey the gas to the combustion chamber under the preheating chamber. The charging floor is singularly free from smoke and heat even after the single attendant has left and the charge has settled low in the cupola.

Detailed information regarding the process of preheating the blast may be obtained from a study of the accompanying illustration Fig. 6. This is not a drawing of the Detroit installation, therefore it differs in some slight detail from the foregoing description. For example the drawing shows a lower windbox around the cupola. In the cupola under discussion the windbox is high up and delivers air to the melting zone through a row of pendant tuyeres. However, the main features are substantially the same and the principle of course is the same in all installations.

Spent gas from the cupola enters the upper windbox and then travels downward as indicated by the arrows until it enters the combustion chamber shown at the bottom of the illustration on the left. The flame from the brick combustion chamber rises through a great many small openings provided for the purpose in a brick arch and then spreads out under an iron base plate supporting 196 cast iron tubes, each 3 5/16-inch inside diameter. From the tops of the tubes the gas enters another chamber from which it is drawn by an exhaust fan through a 24-inch pipe and eventually passes out through a small stack in the roof.

In effect the device operates on the same principle as a water tube boiler. The flame heats the tubes to approximately 1000 degrees. The cold blast enters at one side near the top of the tube chamber and is deflected among and around the hot tubes by a series of horizontal baffle plates. Heated to between 400 and

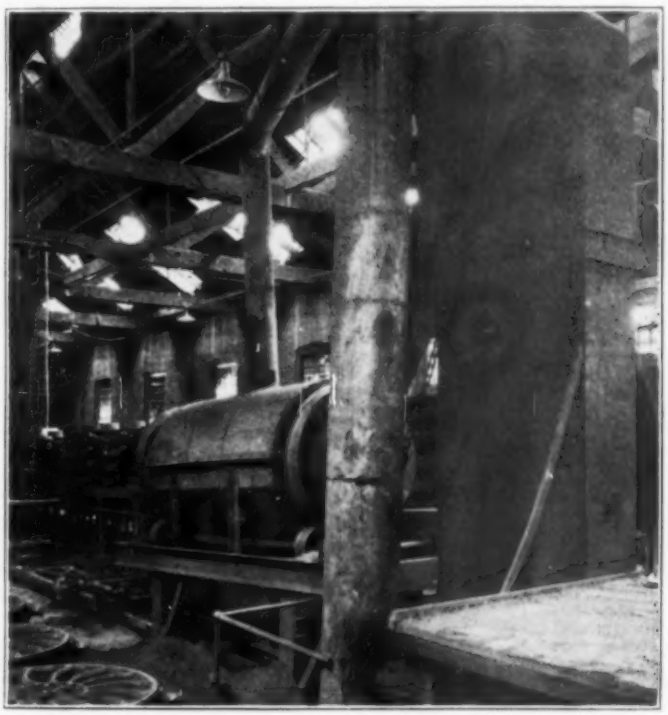


FIG. 9—THE THREE ARM DEVICE OPERATED BY AIR SWINGS THE DRAG THROUGH THREE STAGES OF PROGRESS AND THUS KEEPS THE RAMMING MACHINE WORKING TO CAPACITY. FIG 10—SAND FROM THE SHAKEOUT FIRST IS ELEVATED AND THEN PASSED THROUGH A REVOLVING SCREEN ON TO A RECIPROCATING CONVEYOR BELOW THE FLOOR LEVEL

600 degrees Fahr., the blast passes out at one side near the bottom of the same chamber and then is conducted to the bustle pipe supplying the tuyeres.

Sufficient space is provided in the chamber above the tubes for an attendant to enter once a week and run a flue cleaner through the tubes to clean out any accumulated dust. No figures are available on the life of the tubes. In two Griffin Wheel shops in Chicago they have been in use for over a year without any sign of deterioration.

The method of operating the cupola has been the last of three major factors in the sequence of producing castings to be changed over in this foundry during the past few years. In the first the system of making the molds was placed upon a mechanical basis. In the second the method of charging the cupola was placed on a similar basis and finally to effect further economies, the equipment herein described was installed to preheat the blast before it entered the cupola.

Without Interruption

All the foregoing changes were made without interfering with the regular production schedule and a great deal of the work was done by the company's own employes. Advantage of course was taken of slack periods and what otherwise would have been idle days to change from one system to another. The most extensive change was that involved in dispensing with the old equipment and method for hand molding and the introduction of molding machines, sand handling equipment and conveyors on which the molds were poured, and the empty flasks afterward returned to the molding station. The molding machines were supplied by the Herman Pneumatic Machine Co., Pittsburgh. The sand handling and conveying equipment were designed and constructed by the C. O. Bartlett & Snow Co., Cleveland.

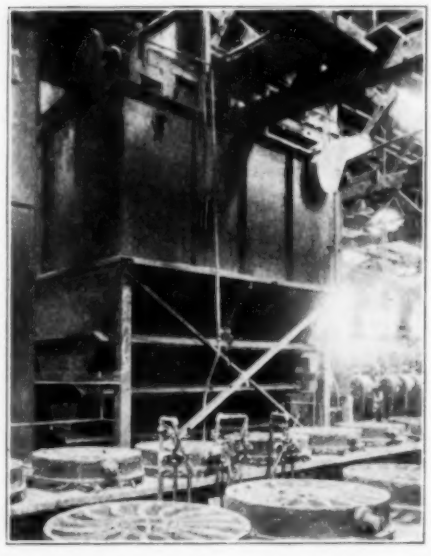


FIG. 11—ONE OPERATOR AT THIS CONTROL STATION REGULATES THE MOVEMENT OF BOTH SIDES OF THE MOLD CONVEYOR AND THE TRANSFER AT EACH END

The mold conveyor as shown in Figs. 1, 7 and 8 occupies a space approximately 150 feet in length in the center of the foundry and opposite the cupola and mixing ladle. It is made up of four main sections, one on which the molds pass the pouring station, a similar parallel line back of the first which carries the empties back to the molding station and a transfer car at each end which shifts the cars from one track to the other. The car at the shakeout end is shown at the lower center in Fig. 8.

Great flexibility in movement of the conveyor is secured by independent control of each of the four sections. An operator standing by a group of valves located between the two main sections of the conveyor and about 30 feet from the first end, moves any one of the sections at will. Usually the movements of all four sections synchronize closely and move with the regularity of clockwork, but occasionally the movement of one section must be retarded or accelerated out of step with the others.

Compressed air is used for motive power throughout the foundry. It is applied in an ingenious manner to the movement of the conveyors, particularly to the transfer car at each end. A cable from one end of the transfer car is attached to a vertical air cylinder on the wall. The other end is attached to a counter weight. When the air is applied the loaded car is pulled from the end of one conveyor track to the corresponding end of the other track. When the air is released the counter weight pulls the car back to its original position to receive the following car.

Work Closely

The length of the cables has been gaged so nicely and the spring bumpers arranged so efficiently on the edges of the transfer pit that the position of the cars does not vary an infinitesimal part of an inch

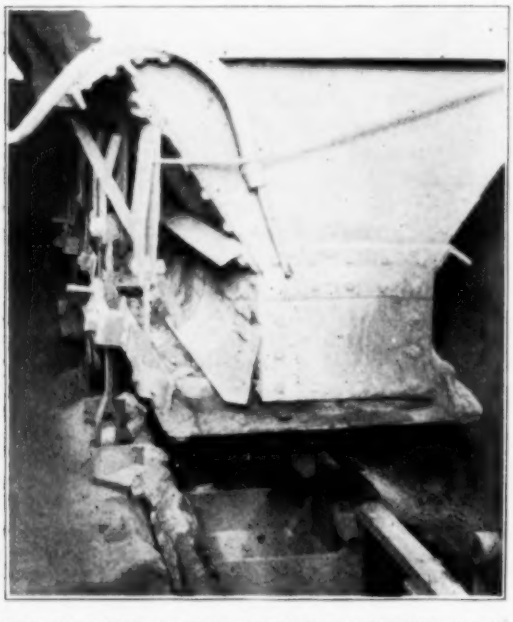


FIG. 12—SAND IS FED FROM THE BOTTOM OF THIS TANK AND WET DOWN AS IT ENTERS THE RECIPROCATING CONVEYOR.
FIG. 13—COPES AND CHILLS ARE SENT BACK TO THE MOLDING STATION OVER A SERIES OF ROLLER CONVEYORS

throughout the day. Every movable part is on roller bearings and the cars move with a minimum of vibration.

At the far end of the conveyor the cars supporting the poured molds are shifted in turn from the conveyor track on which they arrive on to the second conveyor traveling in the opposite direction, back toward the molding machines. In this manner the movement practically is continuous. Each time a car with a new mold is shifted at one end from left to right a corresponding poured mold at the other end of the conveyor line is moved right to left. A free hand sketch of the layout, not drawn to scale is shown in Fig. 7.

Drag molds are rammed on a plain jolt machine served by an ingenious three-arm device developed by F. K. Vial, vice president and chief engineer of the Griffin Wheel Co. Each arm of the device shown in Fig. 9 carries a duplicate pattern and the entire set of arms revolves as a unit around a central pillar. Also it may be raised and lowered each time it is shifted from one position to another. Each time the arms are lowered the pattern on one comes to rest on the table of the molding machine, the second arm rests on a suitable stand from which the drag is removed by a jib crane and placed on the conveyor. The third arm comes to rest on another stand where the face of the pattern is covered with a thickness of facing sand and a drag flask is lowered on top of it.

Assuming that the three drag flasks and the three patterns are in the position outlined, the method of handling them is as follows: The drag on the molding machine is filled with sand through a spout from an overhead bin. Then the jolter is started and at the same time a round weight with lower projections to fall between the ribs on the pattern, is allowed to rest on top of the mound of sand and sink down with it. It is claimed that this method of ramming more than any other approximates the condition produced with careful and skillful hand ramming.

The sand on top of the drag then is struck off level and the three arm device lifts all three flasks and revolves one third of a circle, 120 degrees. This movement places the rammed drag on the second station where a bottom plate is fastened to it and from which it is lifted by a crane, rolled over in a suitable bail and then lowered upon the conveyor. In the meantime an empty drag has been placed on the pattern at the third station and the drag ahead of it has been filled with sand at the first station and jolted. In this manner the steady stream of drags passing over the molding machine utilizes its ramming ability almost to capacity.

A single car for each mold is provided on the conveyor. On account of the flexibility of the system, several drags may accumulate on the back conveyor before they are taken one by one on the transfer car and move to the front track. Similarly a number of drags may accumulate on the front conveyor before they are covered with copes.

Two plain bumpers and two crews of men are required to keep the supply of copes equal to the drags. The installation and method of doing the work are shown in Fig. 5. Cope and chill of course never part company during the period of their active life. The combination is lifted by a jib crane from a gravity roller conveyor and placed on the jolter. Here it is filled with sand from a swinging spout connected to an overhead bin. The sand is rammed by a combination jolt and squeeze. The jolt is furnished by the machine and the squeezing action is effected through a weight which is suspended from a small crane and allowed to rest on the sand during the jolting period. An illuminating view of the equipment and method of application is shown in Fig. 5.

The copes are lifted from each machine alternately, rolled over in a bail suspended from a monorail and placed temporarily on their backs while an attendant inserts the chaplets designed to hold the *pan* core in place, that is the circular chamber core between the two webs in the wheel. The cope then is picked up again and pushed forward along the curved monorail until it is suspended above one of the drags. Here it is lowered into place.

A flat circular core with two gate openings 2 x ½-inch on either side of a tapered core print is placed over the top core print on the pattern before the cope is filled with sand. A round block is placed on top of the core and is withdrawn after the cope sand is rammed. In this manner the runner basin is formed at the same time as the remainder of the mold. An air hose is employed to blow any loose sand out of the runner basin and gates before the cope is taken to the drag.

FIG. 14—MOLDS ARE SHAKEN OUT IN A VIBRATING BAIL OVER A GRATING IN THE FLOOR

Under ordinary circumstances the stream of metal runs continuously from the cupola into a 15-ton mixing ladle. Small bottom pour ladles are filled from the mixer and used either to pour the molds on the conveyor or miscellaneous molds, odd size wheels, chills, plates, flasks and

(*Concluded on Page* 754)

Northwest Offers Field for *Synthetic Cast Iron-II*

By G. A. Schaller

ALL materials necessary for the production of synthetic foundry iron that have been discussed originate in the Seattle territory. These include all of the major raw materials. Other materials necessary to the process also may be obtained locally. Among these are included limerock, and refractories in various forms. Limerock is used as a slag forming agent and assumes considerable importance for certain classes of product. Inexhaustible supplies of this material are found along the Puget Sound country, possibly the largest being at Roche harbor. Other important sources of limerock are located in northern Washington both east and west of the Cascades.

A source of supply for fire brick for use as refractories in the furnaces is located in Seattle. The desirability of these refractories may be determined from the following discussion of the subject appearing in a bulletin of the experiment station of the University of Washington: "All grades of fire clay brick from the highly siliceous, kaolinitic to the high aluminous flint fire clay types are produced in the state. . . . high temperature electric furnaces work is available for the manufacture of silicon carbide from local quartz." This latter material will prove valuable in the synthetic process for a dual reason, namely: as a carburizer and as a material for adding silicon to the molten metal to bring the silicon content to proper grade specification.

The latter usually is accomplished by the addition of ferrosilicon, a material not produced locally but available from California, the eastern part of the United States or England. The same is true of ferromanganese. Fluorspar also must be shipped in since no local deposits exist so far as is known.

Electrodes which form a considerable part of the cost item in electric furnace operation are not produced in the west, but are obtained from the east. Japanese made electrodes also are offered on the local market but their high price over the domestic products does not make them a serious competitive factor.

In discussing the synthetic process of foundry iron manufacture, the different materials entering into the problem have been treated from the standpoint of their availability in the Seattle district. It is obvious that the matter of labor involved in carrying on the process is of similar importance and interest. The classification for employment in this industry may be divided into three groups, namely, unskilled, skilled and technical. These groups are listed in the order of their importance from the standpoint of numbers employed.

Gives Costs

Materials which must be obtained outside of the Seattle district, the labor situation and the cost of producing synthetic iron, are discussed in this article, which is the second section of a paper presented at the Syracuse convention of the American Foundrymen's association. The author also points out that markets for the various products easily may be established, and gives the uses for synthetic cast iron in specific types of castings.

In discussing the labor situation, it is necessary to assume that a market exists in which it is possible to employ men who are willing to work shift hours since the synthetic process to be conducted as effectively as possible will demand 24 hours a day operation for at least a part of the crew composed almost entirely of unskilled labor. However, this should not prove a serious handicap, because shift hours are common in this locality in two major occupations: lumber mill operators and longshoremen. Fishing comes in for rather irregular hours of extended duration. According to the reports issued by the Seattle chamber of commerce no shortage of unskilled labor existed in 1925. However, a considerable element of labor properly can be termed as seasonal. These men form the bulk of those employed in logging camps, the harvest fields of eastern and the orchards of central Washington. For the most part these men are unmarried and migrate to Seattle during the off-seasons. It is altogether reasonable to assume that a part of this class would locate here permanently if steady employment were available.

Present conditions in Seattle point to a continued condition of abundant labor. There always are available those who join the fishing fleets when other employment is scarce. The rapid gain in population of the various Pacific coast cities creates a sort of labor pool. Due to abundant ocean traveling facilities between the ports on the coast it is relatively easy for labor to migrate from unemployment centers to those cities where employment is offered, simply by working aboard ship in exchange for transportation.

Skilled labor required in this enterprise in reality can be divided into two groups; molders and melters. In addition there will be a millwright crew necessary, with such mechanics as electricians, brick masons, machinists, maintenance, men, etc. A majority of these men also are closely allied to the building trades. There appears to be a sufficient supply of these men in Seattle due to its expansive building operations and more are attracted continually from other sections of the United States.

The number of iron molders available seems to vary with the foundry activity. There does not appear to be a shortage of these mechanics that is of a pronounced character. The local situation has not received the attention accorded it in the foundry centers throughout the east. The fact is that fewer young men are entering the molding field each year. Large employers of molders now are experimenting with apprentice training courses and trade schools in foundry centers are offering trade courses in an endeavor to make up for the shortage of molders particularly among the young men. Seattle has not found it necessary to interest itself in such work.

Any shortage that might develop in connection with molders should not prove of serious consequence to the proposed synthetic foundry iron industry because, as already pointed out,

this industry to survive, would call for large scale production and in that event the industry would have to be supplied with mechanical molding equipment and semiskilled operators could soon be developed to take care of the molding machines assisted by training foreman and pattern makers.

The matter of securing dependable furnace operators and melters would prove the most difficult. Competent electric furnace operators are not abundantly available in any section, due largely to the newness of the electric furnace or more particularly to the lack of a complete understanding of its operation or possibilities. It would be necessary to train men for this work—this training devolving upon the technical staff employed.

Costs Are Considered

In discussing the possibiliites of locating a synthetic foundry iron industry in Seattle, it is necessary to make some estimates relative to the cost of production of this iron. In attempting to arrive at some definite conclusions, the writer has availed himself of data resulting from actual tests conducted in this process. In making up an estimate covering the cost of production of a ton of synthetic iron, it must be remembered that the process still is new that practice now accepted as standard, will no doubt generally be improved so that should this enterprise be taken up commercially in the future, all cost figures should be viewed in that light.

Ferrous metal for the base charge would be steel scrap as mentioned in the section on materials. The market price of this scrap for the past several years is shown in Table IV. In reviewing these figures it should be remembered that the market was under government control during the war years.

These prices could be shaded somewhat for the low grade of scrap used in the synthetic process. A price of $10 per gross ton is assumed here for the purpose of calculation. This price while high seems to be about right for an average over the period since the war, excepting 1920. There is also the likelihood of the market strengthening over its present figures under the stimulating influence of such an industry locating here, consequently it appears that a price of $10 per ton for scrap steel is conservative.

The next item of major importance is that of the cost of power. In this regard the projected process will show well in view of the favorable rates offered by the Seattle power companies. The tariff covering the power costs as issued by a local power company reveals the following rates:

Kilowatt hours	
First 100, per month	4 cents per kilowatt hour
All excess per month	1 cent per kilowatt hour

The above rates are subject to the following discounts based upon maximum demand:

Horsepower	
1 to 20	No discount
21 to 101	12½ per cent discount
101 to 250	25 per cent discount
250 to 500	35 per cent discount
500 and over	40 per cent discount

In addition to these discounts, there is an off-peak discount of 25 per cent allowed. The peak hours are those from 4:30 until 9:30 p. m. each day.

It is believed that in order for the synthetic process to show advantageous costs it would need to operate on such a scale that maximum discounts could be taken advantage of. In that case, current at off-peak hours could be had at a cost of 6 mills per kilowatt hours plus an annual overhead charge of $5.40 per year per connected kilowatt. This latter charge is not actually a direct charge for power—in reality it is a charge for the distributing system which makes possible the delivery of the power. Using this figure it readily can be seen that so far as power is concerned Seattle is admirably situated for the electric furnace industry.

In the matter of carburizers a wide range of prices is encountered due to the quality of the material. Local coke of acceptably low sulphur content is available at about $10 per ton; although the use of this coke would prove undesirable because of its high ash content adding more labor per ton and requiring more power per ton. The writer believes that the suggestion previously made relative to the use of charcoal briquettes would prove an economical solution to the carburizer problem. There is, of course, no data available covering the costs of this carburizer so an arbitrary price is largely a matter of speculation.

An estimate for the cost of production per net ton of synthetic foundry iron based on the amount of material required as shown in Table II would result in the figures shown in Table V.

To these figures must be added the items of labor and indirect materials plus a certain cost for manufacturing expenses. These items can be estimated as follows:

	Per net ton
Linings and ladle expense	$2.50
Direct labor	3.50
Manufacturing overhead	2.25
	$8.25

These expenses added to the costs shown in Table V result in a production cost per net ton of $34.48 which appears to be a satisfactory cost. Unfortunately the writer does not have any comparative costs available for the purpose of checking the above estimate. R. C. Gosrow in the *Journal of Electricity and Western Industry*, Vol. 47, No. 7, makes an estimate on the possibilities of the synthetic process and his cost per net ton in the ladle of gray iron using steel scrap are $40.75 from a furnace of 1-ton capacity and $43.60 for a 3-ton furnace. He uses a cost of $15 per net ton for scrap and 1.5 cents per kilowatt hour for power. The balance of his costs are similar to those shown in Table V. Allowing for the differences in the costs of these two major items—the costs as estimated by the writer are quite close to those of Gosrow. In estimating the amount of power consumed the figures in Table II were followed. It appears though that these estimates are liberal. E. C. Wilson in the *Electrical World*, Vol. 82, No. 9, states power consumption per gross ton melted as being as low as 600 kilowatt hours.

Larry J. Barton in a letter to the writer states that during March, 1925, he operated a 1½-ton furnace for melting scrap, at McGill, Nev., which consumed 590 kilowatt hours per ton charged demand 1000 kilowatt hours. These figures are based upon a total charge of 465 tons of scrap. In these runs 85 per cent of the product was white iron which accounts for the low power consumption there being but a small amount required for carburizing purposes.

It is interesting to compare the costs of synthetic iron with those of the cupola melted metal, its greatest competitor. A careful set of cost figures have been kept on melting costs in the foundry of the department of engineering shops at the University of Washington which show that over the period of a year the cost of gray iron in the ladle per net ton is $44, exclusive of labor. In other words the figure of $44 is directly comparable to $26.23 shown in Table V.

This difference may be accounted for largely from the costs of the raw materials used. For cupola melting the scrap iron cost $20 per net ton and pig iron $36 per gross ton as compared with a price of $10 per gross ton for steel scrap. A leading local foundry gives its cost of cupola iron in the ladle as being about 2.1 cents which compares very favorably with the figure already quoted.

A comparison of cupola metal costs with those of the electric furnace

shows a decided advantage for the latter from a monetary standpoint alone. Added to this there is the advantage of quality of the metal.

Advantageous costs as shown previously indicate that the synthetic process of making foundry iron sucessfully can compete in the foundry iron field in Seattle. The process can go even farther, in the opinion of the writer, by entering the pig iron market. Such a procedure would have been comparatively simple prior to 1924 due to the lack of a source of supply of pig iron. However, a Utah blast furnace is making itself known all along the Pacific coast because most of the pig iron manufactured is being sold on the coast markets. The service rendered by this furnace makes it possible to deliver orders for pig iron in Seattle two weeks after the order is placed. This pig iron sells at practically eastern market prices plus the carrying charges from the plant to Seattle. The total cost of Columbia pig iron then is but little below that of the synthetic product.

Table IV

Scrap Prices

Year	Market price Gross tons
1917	$20.00
1918	20.00
1919	11.50
1920	20.00
1921	8.50
1922	9.50
1923	10.50
1924	9.75
1925	10.25

It appears from the foregoing, nevertheless, that the synthetic process can hardly hope to maintain itself purely on a pig iron market. However, two modifications though, may make synthetic pig iron competitive. In the first place iron of practically any desired analysis can be produced. On that basis alone a considerable market exists. For example, the United States navy yard at Bremerton buys a special grade of pig iron designated as No. 4 which is a charcoal iron. They also buy a special brand which is high in silicon and low in phosphorus. During the past five years the purchases of these brands of pig iron have amounted to 377 net tons costing $12,136.

Create Special Market

Since the product resulting from the synthetic process has so many possibilities both from the standpoint of chemical analysis and physical properties, it would appear that a considerable market for special pig iron would be created. This problem would be a technical one whereby the technical staff of the synthetic industry would work in close harmony with the foundry owner with the end in view of developing pig iron of such specifications as to result in a superior foundry product. Such a service undoubtedly would be welcomed by the foundries because of the obvious betterment in their product. An added feature would be the developing of new products by those foundries which may have been hindered by the inability of securing pig iron of desired analysis.

A case in point would lie along the lines of developing a pig iron that would resist corrosion. A large potential market exists in the Seattle district for castings that will exhibit non-corroding properties because of their adaptability to marine work.

The synthetic process could develop its pig iron market along such lines to a point where they would be non-competitive with the blast furnace product. From the standpoint of standard brands of pig iron there would be little likelihood of invading the present market due to a slightly higher production cost. The methods employed to gain entrance to the present markets should consist of offering immediate delivery of a quality product. Also a certain amount of pig iron will accumulate at the plant in the form of *over iron*. That term means iron melted in excess of the requirements for casting purposes.

Such metal would be poured into pig molds and could be sold at an advantageous price because the largest share of its melting cost would be charged to the castings made. In other words, it is practically impossible to melt just the exact amount of iron required for a certain mold or series of molds so as to be on the side of safety a small excess is usually melted. Instead of remelting it as foundries must do, it could be pigged and sold as pig iron under the circumstances already described. This practice combined with the one described on the development of special irons should result in creating a substantial pig iron market.

It might be well to mention that the present pig iron market for the Seattle district embracing the Puget Sound cities such as Tacoma, Everett and Bellingham, reaches a total of from 7000 to 8000 gross tons annually. To this figure may be added the pig iron consumption of Portland, Oregon, which amounts to about 10,000 gross tons annually, making a total existing pig iron market of 17,000 to 18,000 gross tons annually. A possible export business might be developed to bring the total pig iron market to 20,000 gross tons annually.

Foundry Iron Products

In the field of foundry iron products the synthetic process finds itself most comfortably situated. There are numerous reasons for this, the principal one being in the favorable cost of production.

The jobbing business or small lot production field would not prove particularly attractive inasmuch as the sales expenses would be high and it would be next to impossible to keep a satisfactory volume of orders on hand to insure proper scheduling. The plant would have to be kept running to its normal capacity to produce at satisfactory costs. Shut downs and intermittent operation of electric furnaces are expensive. There would be a certain volume of jobbing work available that would be desirable.

At the present time there is a definite trend toward diesel engine building in Seattle. Such activity calls for castings of high physical standards—especially the cylinders where a dense iron is required. Other parts of the engine could be lightened by substituting stronger castings such as are produced by the synthetic process for the bulkier ones now used. This development would have far reaching effects in the diesel industry where excessive weight per horsepower is now one of the difficulties.

Synthetic foundry iron, because of its superior density, high physical properties and machinable qualities, would be especially desirable for such products as internal combustion engine cylinders, locomotive cylinders, brake shoes, hydraulic pumps and castings, high pressure valves and fittings, machinery exposed to heavy stresses, and chemical equipment.

Table V

Production Cost

Material	Quantity	Cost	Extension
Steel scrap (turnings, etc.)	2000 lbs.	$ 10.00 gross ton	$ 8.95
Carburizer (charcoal briquets)	140 lbs.	20.00 N. T.	1.40
Ferrosilicon 50 per cent	80 lbs.	150.00 N. T.	5.60
Ferromanganese 80 per cent	10 lbs.	150.00 N. T.	0.75
Electrodes (graphite)	10 lbs.	0.25 (lb.)	2.50
Lime rock	150 lbs.	6.50 N. T.	0.48
Fluorspar	20 lbs.	25.00 N. T.	0.25
Power	700 K.W.H.	0.90c K.W.H.	6.30

Adopt Cast Houses in Britain

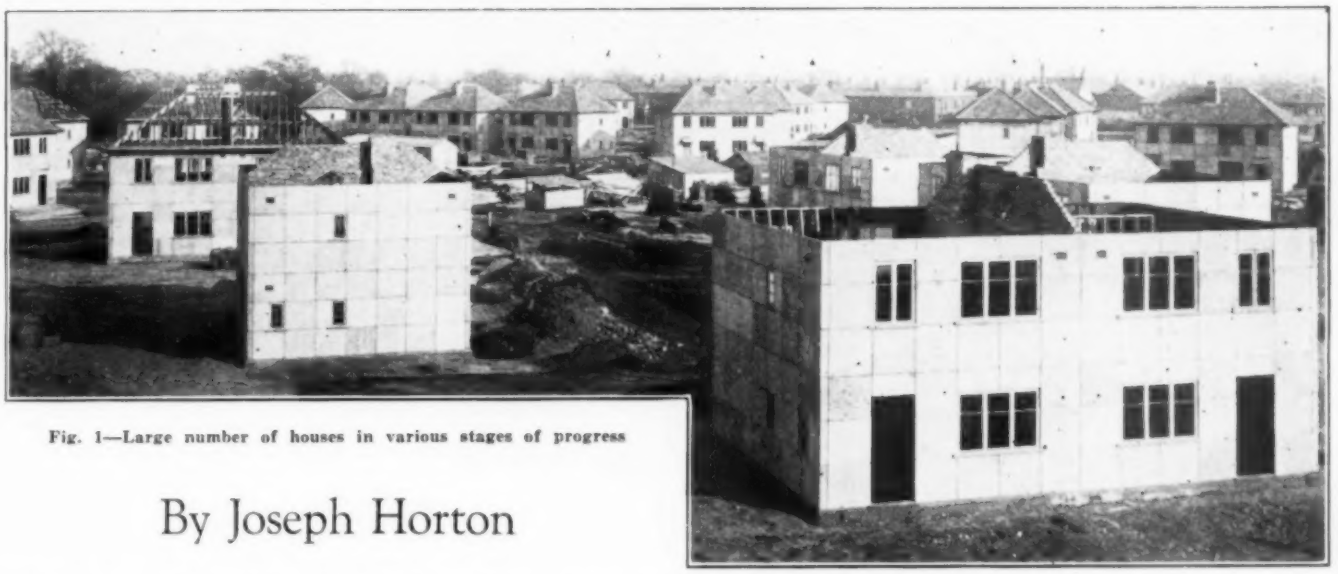


Fig. 1—Large number of houses in various stages of progress

By Joseph Horton

SCARCITY of houses particularly those within the reach of workingmen and others of comparatively limited income has presented a vexing problem in Great Britain for many years. War time conditions forced this subject to an issue and as a result several methods have been adopted to relieve the situation. Cooperation has been established in many places between the municipality and private builders and in addition the financing has been assisted by government subsidy. Recently this subsidy has been drawn upon so heavily that Neville Chamberlain, minister of health has announced it may be reduced or withdrawn.

Shortage of brick and building workmen has directed the attention of contractors and builders to steel, concrete and other materials. Cast iron now occupies a prominent place on the list. Newton Chambers & Co., Thorncliffe near Sheffield, has developed a style of house fabricated almost entirely from cast iron plates and has erected a large number on spacious sites near Sheffield, Derby and many other British towns. Mass production methods have been adopted to such an extent that 500 houses were in progress at one time near Derby. Within six weeks after the site was taken over, the houses were being completed, handed over and occupied by tenants at the rate of 12 to 14 a week.

The firm of Newton Chambers & Co., Ltd., was established in 1793 when 20 working people were employed. At present the plant is spread out over an immense area and gives employment to 8000 people. Comprehensive products range from small sanitary and domestic fittings up to the complete blast furnace and steel making plants. Notable gas works and chemical works plants have been erected by the firm in various parts of the world. Facilities in the heavy work foundry provide for the production of castings up to 100 tons in weight.

Some time ago the firm decided to utilize part of its plate casting foundry in the production of rectangular flanged plates for house construction. It seemed reasonable to assume that these houses might be erected to closely resemble brick structures. A careful analysis of cost indicated that cast iron houses easily might be erected in competition with brick.

Up to the present the new venture has turned out satisfactorily. Types of houses built within a radius of 50 miles of Sheffield are shown in the accompanying illustration Fig. 1. Exclusive of foundation and drains it is stated the total cost of one of these houses is £425 ($2125) for the *C* type and £450 ($2250) for the *D* type. The rapidity with which the houses may be erected and the consequent reduction in the labor cost is important.

Cast iron plates in infinite variety

FIG. 2—TYPICAL HOUSES AS THEY APPEAR FINISHED AND OCCUPIED BY TWO FAMILIES

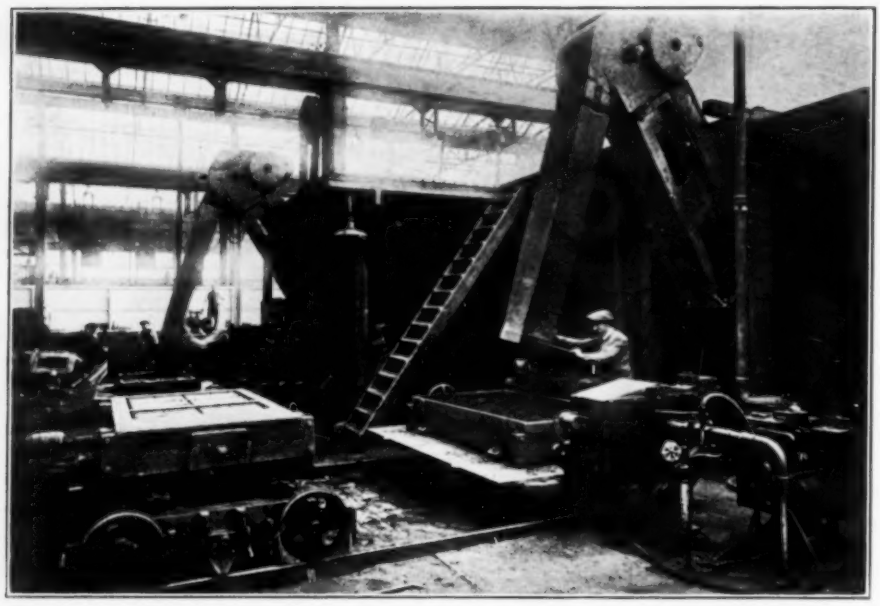


FIG. 3—FLASKS ARE FILLED BY AND RAMMED ON AMERICAN MACHINES

have formed part of the company's products for many years. Equipment for making the plates is shown in Fig. 3 while a section of the foundry floor almost covered with plate molds is shown in Fig. 4. It will be noted that following the British custom no bottom plates are placed under the drags. They are provided with bars and are lowered on to a prepared sand bed after they have been rolled over.

The flasks are filled with sand through special loading devices made by the Osborn Mfg. Co., Cleveland and then are rammed on jolt rollover machines supplied by the same company. After the drag is rammed it is rolled over and then lowered on to a transfer car which takes it out of the way of the machine and holds it temporarily until it is lifted by the crane and deposited on the floor as part of a long row.

In the present depressed state of industry, plenty of reserve labor is available for the work of erection. T. V. Miles, a director of Newton Chambers & Co., Ltd., has calculated that the erection of 50 pairs of cast iron houses per week would give employment to number of men equivalent to that usually employed by a blast furnace, including all those from the ore mine, the coke ovens and the stack itself, say 250 in all. This number is exclusive of the foundrymen and other iron workers directly connected with the manufacture of the plates.

Unskilled labor can be utilized in the erection of these houses. Any workman of ordinary intelligence with a little practice it is claimed can equal the time of 30 hours taken by the regular semiskilled erecting crew sent out by the builders.

General specifications provide that the outer walls shall be constructed of cast iron plates covered with a special cement rough cast before leaving the shops. A patented method of joining the flanges insures completely weather tight joints and provides a secure fastening for the internal wall coating.

Division walls and chimney breasts are of 9-inch brick work bonded into the cast iron shell. Cast iron division walls are furnished if desired. Wood usually is used for internal walls and finish, but some are finished in heavy asbestos cement boards. Roof and porches are covered with red tile. Wood window casements are bolted to the cast iron frame. Many internal domestic fittings, fire places, bathtubs, wash basins, etc., are made by Newton Chambers & Co., Ltd.

Claim is advanced for the cast iron house that the various joints are more secure and weather tight than in ordinary brick houses. Houses may be finished on the inside with asbestos sheets or with regular laths and plaster. Any type of internal lining applicable to brick houses may be used. The illustration Fig. 1, shows a large estate with many cast iron houses in various stages of erection.

Owing to its well known resistance to corrosion, it is claimed that cast iron need not be painted as in the case of steel plate or brick. The builders believe that the life of a cast iron house is indefinite. If it must be dismantled at any period the material will command a fair price as cast iron scrap. In this feature the cast iron house seems to have advantage over houses made from any other material.

In common with experimental enterprises in general, the cast iron house has called forth many questions. The concrete coating, the iron plate and the wide air space in the walls insure insulation against heat and cold. Each panel it self contained and divided from adjoining panels by the flanges on the plates and the jointing strips. This feature acts as a deadener of sound. The minister of health has caused a critical examination to be made on all these and other features and has given the house his cordial approval.

Houses usually are erected in pairs semidetached with a living room 17 feet 10½ inches x 12 feet, a kitchen 9 x 11 feet, pantry 6 feet 3 inches x 7 feet 11 inches and three bedrooms and a bath on the second floor.

Farrand Hall, for the past several years district sales manager, Cleveland territory, has been transferred to the sales department at the main plant of the Carborundum Co., Niagara Falls, N. Y. Harry Collinson, formerly of the Milwaukee office, will succeed Mr. Hall at Cleveland and Carl J. Steuber will succeed Mr. Collinson at Milwaukee.

FIG. 4—MOLDS FOR THE CAST IRON PLATES ARE LAID DOWN IN LONG ROWS

TENTATIVE SPECIFICATIONS FOR 88-8-4 SAND CASTINGS

(*Continued from Data Sheet No. 636*)

(*c*) In the case of castings where, in the opinion of the inspector, it is impracticable to attach a test coupon to the casting, bars shall be cast separately in sand. At least one test bar shall be poured from each melt or heat of metal, or such groups of melts or heats as the purchaser may specify, but in no case shall a lot consist of more than 1000 lb. of castings. The bars shall be cast from the first metal poured from the heat, and the inspector shall witness the pouring of the test mold.

(*d*) If any test specimen shows defective machining or reveals casting defects, it may be discarded and replaced by another specimen selected by the inspector. If additional test coupons are not available, the replacement specimen may be taken from the body of a casting selected by the inspector to represent the lot.

IV. WORKMANSHIP AND FINISH

8. (*a*) The castings shall be free from blow holes, porosity, hard spots, shrinkage defects or cracks, or other injurious defects and shall be smooth and well cleaned, before inspection, by sand blasting, tumbling, chipping or other process approved by the inspector.

(*b*) The castings shall not be repaired, plugged, welded, or *burned in* unless permission from the inspector previously has been secured. This permission will be given only when the defects are such that after the approved repair the usefulness and strength of the casting has not been impaired. Each such repair shall be encircled by a ring of white paint at the time of shipment.

(*c*) All castings shall be true to pattern, free from swells, etc. Wall thicknesses shall be uniform throughout the lot of castings and all cores shall be accurately set.

(*Concluded on Data Sheet No. 638*)

TENTATIVE SPECIFICATIONS FOR 88-8-4 SAND CASTINGS

(*Concluded from Data Sheet No. 637*)

(*d*) Where thick and thin sections join, the manufacturer shall be permitted to add (where not previously provided) fillets of proper size to avoid cracking upon cooling, subject to the approval of the inspector.

V. MARKING

9. The castings shall be marked with pattern or mark number, and when practical with the melt or lot number, at a position on the castings where they will not be machined off in manufacture to finished dimensions.

VI. INSPECTION AND REJECTION

10. (*a*) Inspection may be made at the manufacturer's works or at the point of delivery. Inspection is optional with the purchaser.

(*b*) If the purchaser elects to have the inspection made at the manufacturer's works, the inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacturer of the material ordered. The manufacturer shall afford the inspector, without charge, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications. All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

11. Castings which show injurious defects revealed by machining operations subsequent to acceptance may be rejected, and if rejected, shall be replaced by the manufacturer without charge to the purchaser. The full weight of the original material rejected shall be returned to the manufacturer.

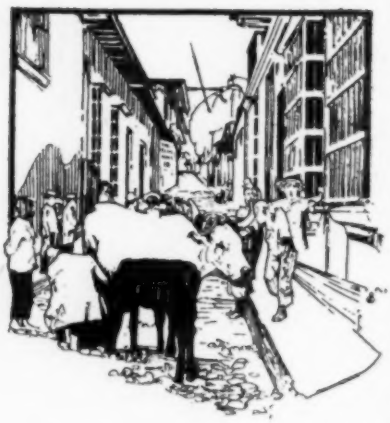
THE FOUNDRY DATA SHEET, SEPT. 15, 1926
Payment will be made for all contributions on foundry and pattern shop practice suitable for publication

Note—This sheet may be cut into two sections, 5 x 7 inches, and may be readily bound in notebook form.

Around the World with The Foundry

Little Journeys to the homes of our readers

Venezuela



ANIMATED jewels, turquoise, emerald, topaz; scarlet, gold and royal purple; drifting on languorous wings from one gorgeous blossom to another in the riotous bloom of an equatorial jungle where the air, heavy laden with the scent from a thousand tropic plants, hangs motionless under a dazzling sky, formed part of the picture that greeted Columbus on his third and last voyage and left him undecided whether he finally had found the far away land of the Indies, or, had stumbled unwittingly into the land of Paradise. Other factors of a more material character influenced bankers to invest millions of foreign capital in developing the resources of the country following its revolt from Spain and its inauguration as a free and independent state with a stable form of government: traceable to the great South American liberator, Simon Bolivar.

Pearl fisheries are prosecuted at Margarita island; the tobacco industry centers in Caracas while the extensive fertile plains watered by the mighty Orinoco and its myriad tributaries, furnish pasturage for innumerable flocks and herds of sheep and cattle. Cocoa, coffee, rubber, salt and all kinds of precious tropical woods are exported and a natural deposit of asphalt rivals the great lake of Trinidad. Nearly all machinery is imported, but as least five foundries are in operation and in three of these THE FOUNDRY is consulted twice a month as an authority on all phases of the casting industry.

"Wherever metals are cast you'll find THE FOUNDRY"

Bill Describes Causes of Hard Spots

By Pat Dwyer

ALMOST every day for the past few weeks I have been receiving reminders that the date of the annual convention is drawing near. Foundrymen as a rule are not voluminous correspondents. I never have met one yet who was not as fluent and voluble as a magpie in discussing foundry subjects in the company of one or more kindred spirits, but in the presence of strangers or in a public gathering they could give the old Sphinx of Egypt a half hour's start and win in a walk. Unfortunately I have no statistics to bear out the statement, but I have a well founded suspicion that these strong silent men who figure so prominently in the movies formerly were molders. True, up to the present I have not seen one of these lads handling a shovel—the most infallible of all tests—but in sundry and divers bar room scenes they deport themselves in accordance with the best traditions of the service. The foot on the rail, hard hat pushed well back out of the way and the graceful gesture in elevating the tall ones, are strangely reminiscent of old dead and forgotten pay nights in pre-Volstead havens of refuge.

How these lads could talk on these occasions. What marvelous castings were made. What perfectly killing retorts were detailed dealing with the time the gaffer ses to me feller where did you learn the trade and I tells him where to get off at. Why say, I tells him, I worked in places they wouldn't let the likes of you claywash a gagger. Then I tells him I'll take my time, see, and I leaves him flat. I would not have you gather the impression that all my foundry friends were roughnecks. On the contrary I can reckon men in the list who are peers in every way of men in any walk of life. Some of them can talk like a book any time and in any place and they can write better English than many a person who makes a living with the good old pen. However, the majority hate to write and as a result I only hear from them once a year when I get a postcard or a postscript to a letter announcing that I probably will bump into them at the convention. Sometimes the word comes from a totally unexpected point of the compass and I look forward with pleasant anticipation to hearing another epic in the life of a rolling stone when I meet the roller at the annual roundup.

This year the convention promises to hang up a new high record in practically every feature. Detroit's favorable geographical location and its reputation as a great foundry center insure an attendance beyond the ordinary from the United States and Canada. The international character of the convention and exhibition with the large delegation of foreign foundrymen confers a prestige and importance above that enjoyed by any former effort of this kind. The papers to be presented cover a wider range than ever before attempted.

Foreign foundrymen will have opportunity to their heart's desire to study and observe American foundry principles and practice. To meet the leading men of the industry and get first hand, intimate information on the technical phases of the industry on this side of the Atlantic. Also they will learn how the principles of business adminstration are applied in this exceedingly large and important industry and draw intelligent conclusions in comparing conditions with those prevailing in their own communities. When Bill came around last night I commented on this apparent reluctance of foundrymen to set pen to paper. He admitted cheerfully that he was afflicted with the disease himself. He said if he had a choice between writing a letter and visiting a dentist he would prefer to spend an hour in the torture chamber of the gentleman who wields the drill and the hammer and chisel.

"This here now letter writing thing" Bill said "must be a gift like the ability to wag your ears or play the jewsharp. Some people can do it spontaneously and without the least apparent effort. In fact I believe some people like to write letters. The mushroom crop of efficiency experts which sprung up and infested the land like a plague of locusts during the war years wrote so many letters and installed so many filing cabinets to hold these letters that the office buildings had to be expanded to a greater extent than the factories. If one of these lads wished to communicate a few burning thoughts to the bird at the next desk he would call in a stenographer and dictate a letter in preference to speaking to him.

"Another species of letter writer and one that never fails to arouse wonder why he or she does it, is the one who writes letters to the paper. Our hero reads a stray item in the paper to the effect that a vicious dog has bitten a child somewhere in Kalamazoo or Hokendauqua and he immediately addresses an indignant protest to the editor. The country is coming to a pretty pass indeed when innocent children cannot play in their front yards without being attacked by hordes of rabid canines. As a citizen and taxpayer, sir, he wants drastic action. Apparently our pussy footing representative in congress, fattening shamelessly at the public trough has lost sight

THEN HE WRITES A LETTER TO THE EDITOR

of the sovereign rights of his constituents. The dastard had better beware. It is a long lane that has no turning. The writer proposes, sir, that a good live committee be appointed in every community to round up all the dogs and either crucify them without fear or favor, or feed them hunks of dog meat strongly flavored with prussic acid or strychnine. He subscribes himself your's etc., Anti Dog.

"Talking about letters to the editor" said Bill "I came across one the other day that is a perfect gem. The writer apparently holds rather pronounced views on a certain debatable subject. He took his trusty typewriter in hand and dashed off the following indignant protest:

Editor the Star—Sir: You seem to take a good deal of delight in telling other people how to live and perhaps that is your business, but it seems to me that you exceed your duty when you arrogate the right to inform all the people who may hapnen to enjoy an occoccasional drink of Scotch.

I have been presented with a fine bottle of Scotch whiskey for Christmas and it is before me as I sit at my typewriter to indite this letter to you. It bears the label Sandy McDonald—a good, fair, well bodied liquor which I am assured was bought before the war and has been in my friend's cellar ever since. What right has any form of law to make me a criminal if I partake of this gift as it was requested that I do by the giver?

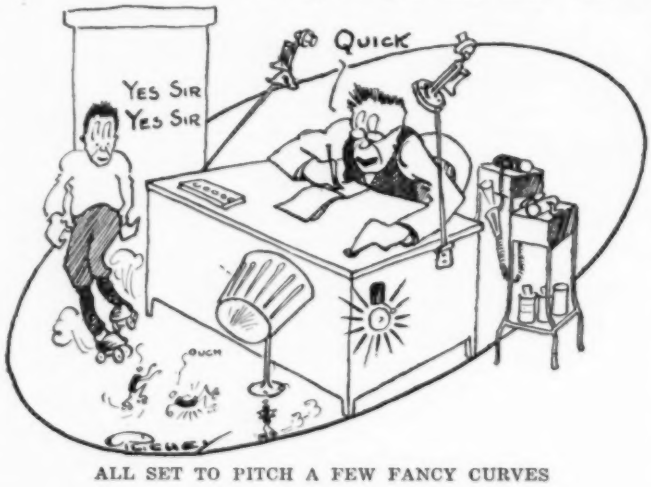
I claim that any such law is an invasion of my personal liberty. I notice that you have referred to the so called Bill of Rights which secures to all men and women certain inalienable rights to their personal liberty, which, as you say, are not inconsistent with the rights of others. How do you reconcile your statements?

I have just taken my first drink from this bottle of liquor, I will confide to you and cannot see where or how I am invading the rights of any other person on earth. I find it excellent. It warms my stomach, it inspires my thought. I cannot feel Mr. Editor, that I have wronged the community or added to the lawlessness of general society in doing so. It makes me tired to be classed as a criminal for any such reason and I notify you that before long there will be a revolt against that sort of stuff you are writing.

Just to show my independence of such truck as you are writing, I have taken a second drink of the aforesaid most jubilant Sandy McDonald and I will say to you that it is about as smooth a drink as a man ever put into his system. This second drink, which I shall soon follow with a third makes me more certain that those who feel their systems require stimulants should band together, organized and start a campaign to floor this silly Volstead business if it can be done.

Now mr. editor I am no bum—you can't make me a bum. Understand? I like a little drink now and then and I have taken a third, or maybe it is a fourth and I am more than ever convinced that any mab who doesn8t is a big idiot. You say that this avadion of the law is producing a state of affairs i our great and glorious country. Your ar wronh. This country is jess as good as it ever was and was a great deal better country and will leabe it to you f it wasn8t when we had free rum.

I want to say to you that this sccitch is all right. What I mean is is all right. A lot of it wouldn't do us any harm. When weqant simulancy we need it. My grandfather was brought up onrum. They had it in the housr all the time. They dranj it freely and even the ministew drank it when he came to our housw. It8s a pretty kin of a cointry when a grandson is bettr than his gundfather. I can drinh this sort of Scicth all day and neber quiberen an iteladth.



ALL SET TO PITCH A FEW FANCY CURVES

I wan so s ay tou yu t ere are 34 " to the last cendus free Amer Amerocam cituxens in the U. S. Th ere are no bums, I say 2 you that yoi male me sicj.

Well, sire, mr. editor, wheb I started ot write this lettet., I had no 2345678 9 notium to taje upp micj ypuor ti.e jack is alwrite in his plaxe he8s payinf too muh attentiom to cirinstanaabshal levid nce. Ther (nom proog of the guiulit of the arstotook shiegg8h. I know the jud e. I want to ememsize fact that HEX ALKRIGHR#

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"There y'are" said Bill as he folded the clipping and put it away in his pocket. "A noble effort, but I don't think even the most rabid partizan would claim that the writer did the cause he championed any good by the publication of the letter. Many letter writers fall into the same error. They either say too much or too little and the reader frequently picks out a different meaning to the one intended by the writer.

"Some time ago a lad forwarded for my inspection a small, cast-iron shaft coupling containing a diamond spot on the upper machined surface. The remainder of the casting as it appeared to the eye apparently was perfect. The metal was clean and solid as might be noted by glancing through the 1-inch hole drilled through the center. In the letter which accompanied the casting I was told that these diamond or hard spots only appear occasionally, but when they do they ruin the point of the tool. I also learned the castings were poured from a mixture made up of No. 1 pig, 300 pounds, No. 2 pig 600 pounds and scrap 600 pounds. Silicon in the No. 1 pig is 3.13 per cent; in the No. 2 pig it is given as 2.66 per cent and the scrap was assumed to carry a silicon content of at least 2.00 per cent. In conclusion the writer stated he placed 1200 pounds of coke on the bed and 150 pounds between the 1500-pound iron charges.

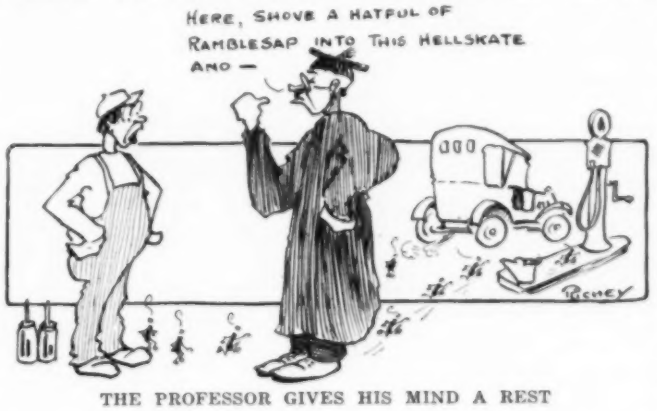
"There is every scrap of information that came with the casting. I am quite ready and willing at any time to venture an opinion on the cause of a defective casting, but except where the cause is perfectly obvious I cannot draw any conclusion unless I am familiar with all the conditions under which the casting was produced. In this particular instance I wrote this lad that he either had destroyed or omitted to give nearly every clue that might aid me in arriving at a decision. The casting was faced on both ends and drilled through the center and as a result there was no trace of a gate or any indication to show which side of the casting was made in the drag. The casting was small and might either have been molded by itself in a small flask or as one of a group in a larger flask. Each of these factors merited consideration since they added to the complexity of the problem. Finally, I pointed out that figures showing the amount of coke placed on the bed of a cupola convey no information unless the diameter of the cupola and the height of the tuyeres above the bed are

given. Twelve hundred pounds of coke might extend 3 feet above the tuyeres in a small cupola. The same amount would fall short of the tuyeres in a large cupola.

"Diamonds in the face of a casting may be due to any one of several causes and the only way to discover the cause is by adopting a process of elimination. As a basic fact it must be remembered that each of these little hard lumps is a chilled shot that in some manner became incorporated in the metal while the metal was in a molten condition either in the cupola, the ladle or the mold. Chilled shot represents drops of low silicon iron in which the carbon has been converted entirely into the combined form through a sudden change in temperature. This change may take place in the cupola, the ladle or even in the mold under any of the following conditions: A hard or wet bottom in the cupola will cause the first iron to boil and if it is tapped in that condition shot iron will be found to a greater or less extent. If the iron is fairly hot and held in the ladle for one or more succeeding taps all or nearly all the shot iron will be remelted before the iron is poured. With a high blast pressure some of the iron trickling down is bound to get chilled and while it stands a good chance of being remelted either in the well of the cupola or in the ladle, still some of the pellets eventually will be carried into the mold. They may be reduced considerably in size on the journey, but usually sufficient remains to jar the cutter on the machining tool. The machined surface on the casting forwarded for inspection showed an exceedingly close grain, much closer than I would anticipate from the analyysis of the iron given. For that reason I was inclined to the opinion that the writer was driving his cupola with a blast that was too high and thus burning out a greater proportion of the silicon than he suspected. As being the most logical cause of the trouble I suggested he should lower the blast pressure for a few heats and note the character of the castings.

"Iron may be melted under ideal conditions in the cupola and still be spoiled in a wet ladle. This applies both to the ladle under the spout and to other ladles in which the metal may be transferred later. Boiling iron splashed over the lip will form chilled shot and if this is carried into the mold it will show up in the casting later.

"Finally the iron may leave a hot cupola in perfect condition and later leave an equally perfect ladle and still form shot if a thin dribble falls on wet or hard sand. In fact wet sand usually will develop shot iron even if the metal is introduced to the mold quietly from the bottom. The steam blows holes through the molten metal and throws some of it in the air in the form of small pellets. Unless the agitation is too violent the metal settles down before the mold is filled and there is nothing apparently wrong with the iron that appears in the riser. Also, the appearance of the casting after it is shaken out may give no clue to the action of the iron while it was rising in the mold. The first indication of trouble is when the machinist takes a roughing cut off the surface and the point of his cutter jumps off one of these little diamond hard points. Sometimes the pellets are buried out of sight, but usually they are formed close to the surface, immediately below the skin.



THE PROFESSOR GIVES HIS MIND A REST

"However," said Bill, "As I said in the beginning, the ability to write letters is a kind of a gift. I believe some people actually like to write them. It's a habit that kind of grows like any other pernicious form of vice. The victim starts off blithely, firm in the conviction that he can write 'em or leave 'em alone. Before he is aware of the danger he is a hopeless addict and a menace to society in that he expects people to answer him. Professors of English are the greatest sufferers. I heard of one who boiled over the other day after a hard day's work with freshman themes. He drove in to a filling station for a little gas and thus relieved his mind to the astonished attendant; 'Here, shove a hatful of ramblesap into this hellskate and don't stand there like you were paralyzed either!'"

Why Lathe Bed Castings Warp When Cooling

Question: We have an order for a considerable number of small lathe beds, but are having trouble with the castings warping. The bed is 8½ x 51 inches supported on four legs 5 inches high. The thickness of metal in the body of the lathe is 3/16-inch and in the legs ¼-inch. The casting is molded face down in green sand with the upper part containing the feet made in the cope. If the casting is not warped leaving the sand, it warps shortly afterward. In some instances an apparently straight casting warps during the machining process. We have tried seasoning some of these castings from 4 to 6 months, but they warped just the same. The iron is melted in an electric furnace and shows the following average analysis: Combined carbon 0.20 to 0.40 per cent, graphitic carbon 2.50 to 2.75 per cent, manganese 0.50 to 0.65 per cent, phosphorus 0.50 to 0.75 per cent, sulphur 0.03 to 0.07 per cent, silicon 2.50 to 3.50 per cent. The bend always is in the same position whether it appears immediately after the casting is stripped or later during the machining process. The casting is humped up in the center as it lies in the mold, or, sagged down in the center when it rests upon its own feet on the floor.

Answer: You do not state whether you chill the *ways* in the bottom of the mold or simply form that part of the mold in sand. With a chill the effect will be intensified but even with an ordinary green sand face on the type of mold to which you refer the bottom of the casting will cool much more quickly than the remainder. Since the under side contracts first it forms the concave side of a bow and holds that shape despite the effort of the thin sides to pull it straight later. Two remedies are available. The first is to heat the casting red hot and either weight down the center, or, place it against a pair of suitable supports where a jack screw may be employed to force the center into a straight line.

Hill & Griffith Co., Cincinnati, manufacturers of foundry equipment and supplies has purchased additional acreage adjoining its present plant in Chicago and will construct several new buildings.

How and Why in Brass Founding

By Charles Vickers

Will Cast Iron Stick to Monel Metal?

A customer wants to learn if it is practical to cast a monel metal plate 1/16-inch thick, and then to cast on this a plate of cast iron 11/16-inch thick? Would it be practical to use these two metals together, or would it be better to use aluminum with the monel metal? We presume the cast iron would burn up the monel metal.

We believe it would be difficult to cast a monel plate of the thickness mentioned in the query unless it was a small one. In fact, we doubt whether it can be done. As the melting point of monel metal is 2480 degrees Fahr., and that of cast iron around 2300 degrees Fahr., it is evident the cast iron will not melt the monel metal. Monel metal inserts are used with cast iron continually. A rolled sheet of monel would be suitable and better than a casting. The only difficulty we visualize is that of attaching it to the cast iron plate, and this problem would be the same with a cast plate also.

Wax Process Described

We would like to obtain some information about the use of wax as a pattern material for making artistic and intricate castings. We have tried a mixture of wax and paraffin but find the sand adheres to it. We have read articles in THE FOUNDRY *on the Lost Art of Wax Molding. What is it? Also what alloy is most suitable for such work; we have been using aluminum bronze, but wonder if manganese bronze would be better, as the work requires a good, strong alloy.*

It is a mistake to assume there is such a thing as a *Lost Art of Wax Molding* as the method of making castings from wax patterns is well known, and an old art the proper name of which is The Lost Wax Process of Molding Castings, and means that in this process the wax form or pattern is lost, because it is melted out of the mold, instead of being drawn as with wood, metal, and plaster patterns.

Bees wax is the best wax to use, but it is sometimes advisable to harden it, which is done by adding rosin, about 1 part rosin to 2 parts beeswax is sometimes used. To reduce shrinkage, venice turpentine is often added, beeswax can also be hardened by the addition of paraffin wax. The lost wax process only is used for castings such as statuary, the molds for which cannot be parted or opened easily. It is necessary first to have an original pattern, which may be a clay figure modelled by the sculptor. Over this clay figure a plaster mold is made. This mold may be composed of a large number of pieces, each fitting into the other, so that like the bricks of a building they can be assembled to form a hollow mold. This plaster mold is lined with clay rolled to the thickness it is desired to make the casting. Into the clay-lined mold is poured a composition of plaster of paris and brick dust, or other refractory, which when set forms a core. The clay is then removed from the surface of the core and it is again set in the mold and wax is poured in, or the wax can be sheeted and be pressed into the plaster mold instead of using clay, thus getting the wax pattern with a core inside, at one operation.

The wax pattern is next suspended in a receptable and the mold is poured around it, or the mold material is plastered on the pattern. When the whole has set, it is gently dried, then heated gradually to melt out the wax. It is heated strongly to burn out any wax left, and to thoroughly dry the mold. It is now ready for the metal. Aluminum bronze and manganese bronze are not suitable for such work. Use ounce metal; copper, 85 per cent; tin, 5 per cent; zinc, 5 per cent; lead, 5 per cent.

Wants White Metal Alloy

We are looking for a formula for a non-shrinkable white metal and would be pleased if you will send us one. If there are certain precautions to be taken in melting or otherwise handling this metal please so advise us.

The following alloy is as good as can be made from the commercial metals found in a brass foundry: Tin, 50 per cent; zinc, 50 per cent. Simply melt the zinc and add the tin and stir the two together. A little sal-ammoniac scattered on the surface will act as a flux.

Seeks Distinct Color

One of our customers feels that if his castings do not have a certain surface color we are not giving him the proper mixture. He wants 85, *three fives, and insists upon a color resembling a casting that has tarnished after a bright dip bath. To obtain this color we must bright dip the castings, which is rather expensive, as our castings come out of the sand with a distinct coppery appearance. We find the sand burns into the castings so hard that an acid bath or tumbling is necessary to remove the sand. We know that it is possible to employ methods to prevent the sand from burning into the castings, and that most of the sand will fall off the castings when they are dumped from the molds. Some of the foundries have been successful in obtaining the color we desire, but we have been unable to find out how it is done. Can you inform us how it is accomplished?*

Ounce metal, or 85, three fives as some call it, does not color well, as compared with some other alloys, such as copper 88, tin 4, zinc 4, and lead 4 per cent. It will be easier to get the color desired if your mixture is changed to the latter alloy.

It is necessary to use virgin metals, with the return gates, etc. The color of the castings will be improved if the molds are well *floured* which is done by shaking on flour once, then blowing off, then shaking a second time and blowing off. Do not be afraid of a little flour when colored castings are wanted, but of course it must not be blown into the corners of the mold and left there. The flouring will help the castings to *peel* that is, the sand will drop off the castings with ease when they are shaken out.

It is advisable to *blow out* the castings in water while they are hot, and this must be carried out expeditiously to catch the color. One man should shake out the mold, and another seize the castings in a pair of tongs and rapidly but easily immerses them in a barrel three parts filled with cold water and as soon as they are well under the surface, he raps them smartly against the side of the barrel. All sand and cores are immediately blown off and out of the castings leaving them bright.

How To Extend Crucible Life

Attention Directed to Faulty Practice Resulting in Rapid Destruction of Crucibles—Detailed Instructions Given for Simple Annealing Oven

GRAPHIC crucibles are composed principally of graphite and clay. The clay will absorb moisture as readily as a blotter, even in a warm dry room. From the time it leaves the manufacturer's plant until it reaches the user, the crucible may have been exposed to wet weather and then later unpacked and stored in an open building. It can be seen readily that a considerable amount of moisture may be contained in its walls.

For good service, crucibles should be restored to a bone-dry condition before they are put into a furnace. If moisture is contained in the crucible wall, when the crucible is placed in a hot furnace, the temperature rises rapidly and turns the moisture to steam. The steam immediately expands, and if in sufficient quantity, will blow a part of the crucible wall away and result in a scalp or spall. If the amount of moisture is small it may develop only minute internal fractures in the wall. Expansion, due to temperature and the pressure of the weight of metal, will attack this weak point and in a short time a crack or pinhole will develop.

Experience has shown that seasoning or ageing a crucible will improve it. Hence a storage oven for crucibles is recommended, to guarantee best results. It will improve crucible service to an extent that will make it pay for itself, and return handsome dividends. The proof of the value of the storage oven lies in the fact that more and more crucible users are installing them and many cases are reported where they are credited with improving the active life of crucibles 50 per cent.

The storage oven is an inexpensive piece of equipment to install and operate and it can be rigged up in a shop in various ways. The top of a core oven forms the simplest base.

Radiates Heat

A core oven radiates a large amount of heat through its top. All that is necessary to form a storage space on top of a core oven is some sheet iron and wire, bolted or riveted around the top of the core oven. The height of the sheet iron shell depends upon the number of crucibles to be stored. The lid of the chamber either may be hinged or simply laid on. If space is desired for double the quantity of crucibles the sheet iron is doubled in height and the crucibles are stacked two high open end to open end.

Heat radiation through the top of the core oven accumulates in the storage space and a drying temperature is maintained. Besides, the crucibles are protected from drafts, which prevents unequal cooling and heating, and eliminates stresses. This is about the cheapest and simplest form of storage oven, and can be built for a few dollars. It is not ideal, for the crucibles should be stored at a temperature above 212 degrees Fahr. (the steam point) to insure absolute dryness, but it will pay well. The temperature in the space can be increased if the joints are made tight and the shell lined with asbestos.

A complete, separate unit storage oven to accommodate the number of pots ordinarily carried in stock may be built easily. Dimensions can be determined on the basis that crucibles may be stacked six high. A half inch clearance between stacks, for heat circulation, is ample. The oven can be built by obtaining sheet iron to desired dimensions, 1½x1½ inch angles for the skeleton and bolting the sections together.

Crucibles should be subjected to radiated heat only. A sheet iron floor is used, over a gas or oil burner,

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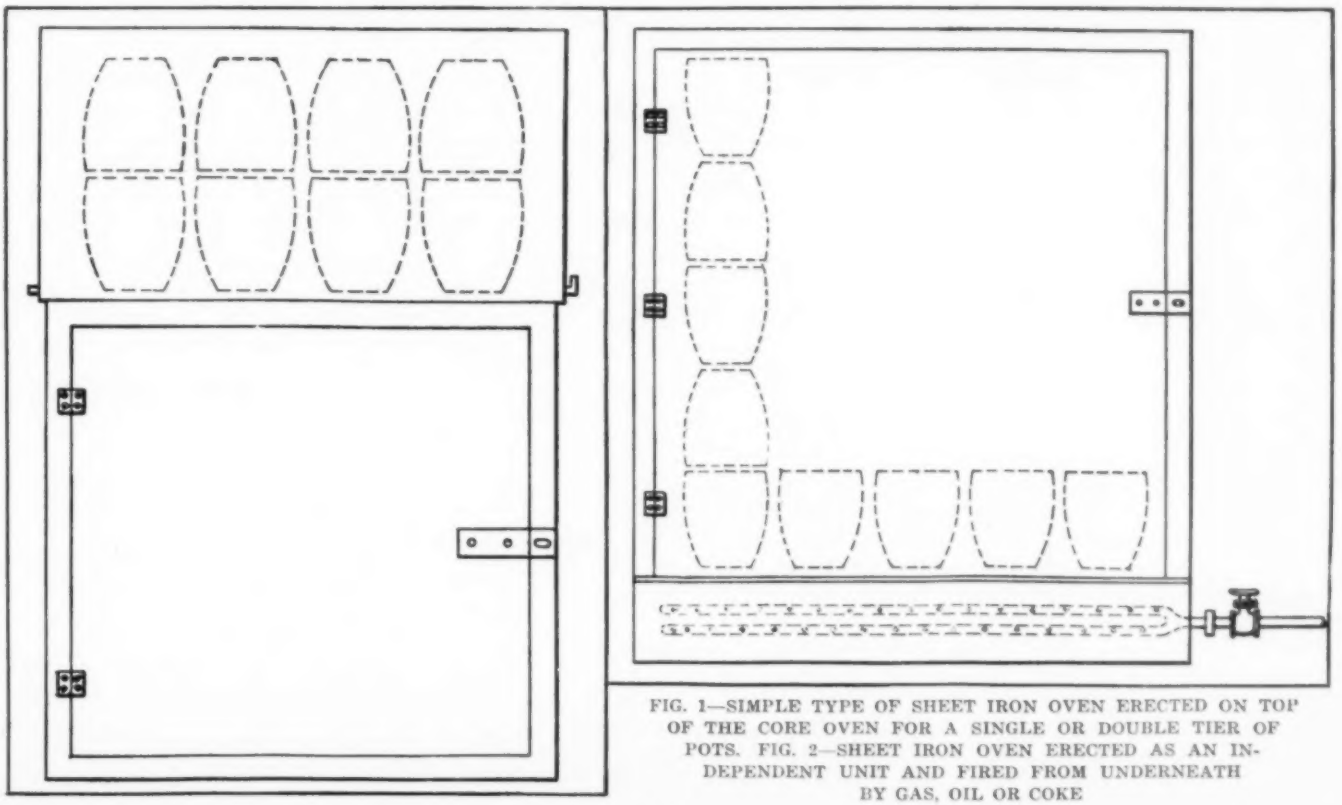

FIG. 1—SIMPLE TYPE OF SHEET IRON OVEN ERECTED ON TOP OF THE CORE OVEN FOR A SINGLE OR DOUBLE TIER OF POTS. FIG. 2—SHEET IRON OVEN ERECTED AS AN INDEPENDENT UNIT AND FIRED FROM UNDERNEATH BY GAS, OIL OR COKE

Band Saw Is Important Pattern Shop Tool

Special Care Is Necessary in the Successful Operation of This Rather Delicate Machine Tool—Safety Measures Are Essential

By Walter C. Ewalt

WHEN classifying the machine tools used in the pattern shop according to their relative importance, the band saw will be found to rank high. The great utility of this tool is due to the fact that practically all shapes may be made on it, including straight work and regular and irregular curves.

A band saw machine consists of a frame, usually cast iron, which supports a table holding the work, two pulleys or wheels and their bearings. The band saw, which is an endless ribbon of steel formed by brazing the ends together is stretched on the two wheels. This endless band has saw teeth cut on one edge. The frame usually is heavy and rigid to prevent excessive vibration. Guards also are provided to protect the operator. The mechanical means employed in running or stopping the band saw on the lower and upper wheels is a direct connected motor or a tight and loose pulley which is operated by a belt shifter. The lower band saw wheel is attached to a shaft which runs in fixed bearings or nearly so as there is usually a slight adjustment necessary to level up the shaft. The upper wheel is arranged so that it may be moved up or down in a slide which is provided in the frame. This *take up* is operated by the screw to which is attached the hand wheel. The *take up* is necessary to accommodate the different lengths of saws and to give the saw the right tension. The tension of the saw also is regulated either by a weight or spring. This arrangement is connected to the bearing of the upper wheel. The spring or weighted lever allows the bearing to drop slightly and also permits a chip, which accidently may get between the saw blade and the pulley to pass between without unduly straining and breaking the saw. Another adjustment is provided on the upper wheel to enable the saw to run true on the wheels. One arrangement consists of a screw which runs through the center of the upper wheel shaft, through the bearing and against the frame. By moving the screw, the wheel is canted out of vertical and the running of the saw is regulated.

Use Adjustable Guide

A movable vertical bar is located above the table and is attached to the frame. This bar is adjustable up and down to accommodate the size of the work. An adjustable guide through which the saw passes is attached to the bar. This guide will be described in detail later. Another bar is located immediately under the table. The table has a slot in the front side which extends about to the center, through which the saw passes. This table ordinarily rests at right angles to the saw but also may be adjusted to a small angle toward the center of the machine and toward the outside to an angle of 45 degrees.

As the work rests on the table, it may be moved into the saw with little effort. The lower pulley is driven so that the cutting side of the band saw is pulled downward and this keeps the saw straight and to the proper tension. Because the saw cuts at the table, the sawdust is carried down underneath and out of the way. However, chips also are carried through which sometimes cause trouble by breaking the saw. The outside diameters of the two wheels are covered with leather or rubber. Rubber is considered the best by the writer as the saw may bed itself in better through its width. The usual size of a band saw in the pattern shop is ½-inch. Most all kinds of work may be sawed with a saw of that width, although a smaller saw and one larger should be carried in the tool room to care for work requiring small curves or heavy cutting.

While a band saw has many advantages, such as speed, thin kerf, continuous cutting and the different

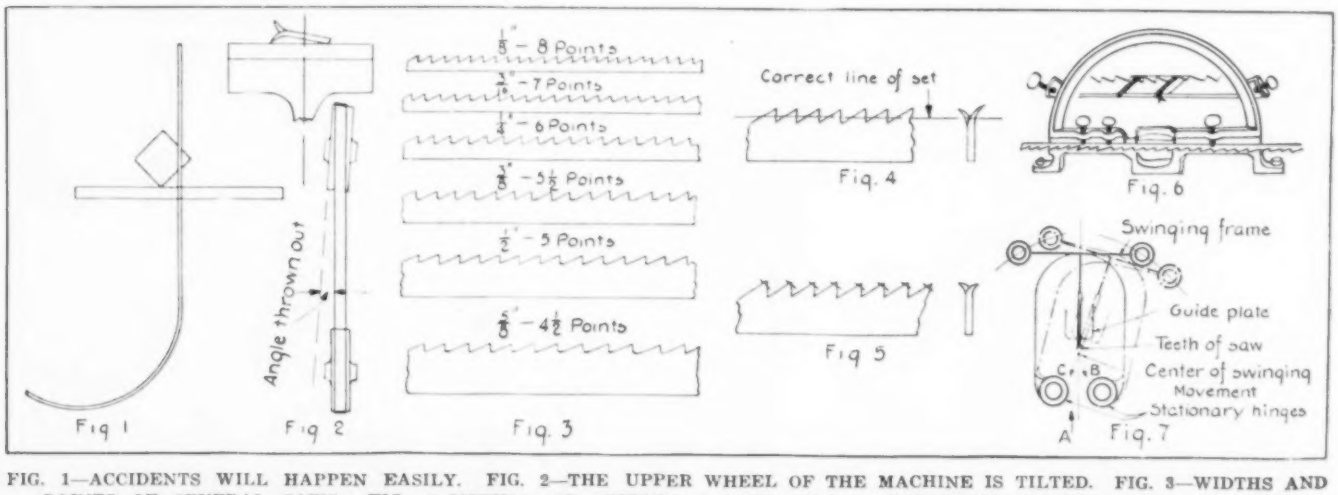

FIG. 1—ACCIDENTS WILL HAPPEN EASILY. FIG. 2—THE UPPER WHEEL OF THE MACHINE IS TILTED. FIG. 3—WIDTHS AND POINTS OF SEVERAL SAWS. FIG. 4—METHOD OF SETTING A SAW. FIG. 5—INCORRECT METHOD. FIG. 6—CLAMP FOR BRAZING. FIG. 7—SPECIAL BAND SAW GUIDE

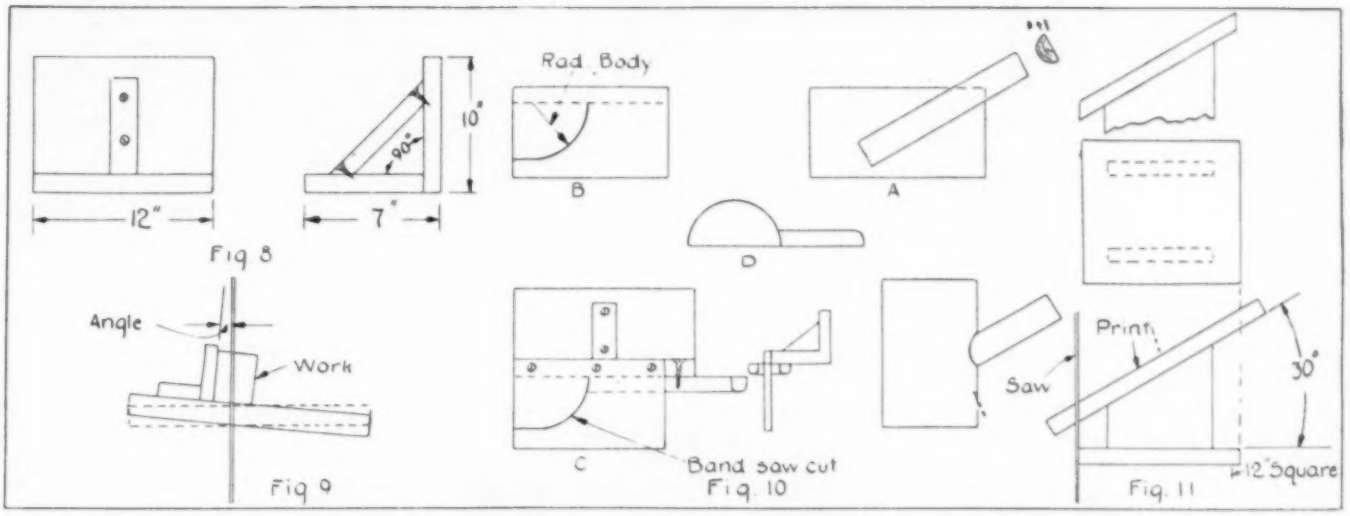

FIG. 8—ANGLE BOARD. FIG. 9—USING THE ANGLE BOARD. FIG. 10—SPECIAL USE OF THE BOARD. FIG. 11—CUTTING A CORE PRINT

kinds of cutting, a number of things make it necessary to watch carefully to obtain the maximum efficiency of the saw blade. In the first place, a band saw is weak and therefore should be of even temper, width and thickness. The joint must be perfect and the teeth filed to the correct shape. In addition to this, if the saw runs against the guides too hard, it will crystallize and if the saw is placed on the pulleys with imperfect tension, it will break. Workmen may break the saw by carelessness, shoving the work in the saw too fast or by the position in which he holds the wood to be sawed.

Care Must Be Exercised

To better illustrate what is meant, in Fig. 1, is shown a way in which the operator used a saw. The saw caught the wood, forcing the man's hand down against the table. The saw was broken and the man severely injured. Other difficulties encountered such as the strain on the saw when suddenly started. If the lower wheel starts at a speed of say 400 or 500 revolutions per minute, the saw acts as a belt in turning the upper wheel. This is a severe strain on the saw and may be relieved some by giving the upper wheel a whirl with one hand and immediately pulling the lever which shifts the belt on to the tight pulley. Another thing which should be done, but often is neglected, is to move the guide to as near the top of the work as possible, which throws the strain against the guides. Otherwise the saw is bent back and may break. As previously mentioned, an adjustment is provided at the upper wheel to throw it out of vertical so that the saw will travel properly. This is necessary as the saw blade may not be straight for various reasons, but principally because the joint is not brazed properly. Since the teeth must be set, that edge of the saw is running in a larger diameter and at more velocity than the back of the saw and so the upper wheel must be canted to take care of this difference. This is shown in Fig. 2 which illustrates the wheel canted so that the front and back edge will have the same strain, and the velocity will be equal. It will also be seen that the middle of the saw does not touch the wheel, at least in actual practice it does not bed itself with the same tension as the teeth or back side. Then again, the constant rubbing on the rubber band by the teeth, causes it to wear unevenly. All of these things tend to make the saw run crooked or snaky and makes it necessary to adjust the upper pulley so that the saw will stay on the wheels and travel without jumping off.

The saw should contain a certain amount of temper, otherwise it will not retain its cutting edge. The temper may be ascertained, by the spring noted when folding up the saw and by filing, that is, the elasticity when it is bent and the manner in which the file takes hold. Temper should be uniform throughout but not brittle or the saw will crack. The temper should not be so mild as to make the cutting edge soft or so soft as to pull the tension out. In other words, a tough medium temper is wanted.

Teeth Are Standardized

A band saw is a delicate and weak tool for the amount of work it does and on this account the teeth are as short as possible, and at the same time, enough room should be left for the sawdust so that it will not pack. A standard has been set up for nar-

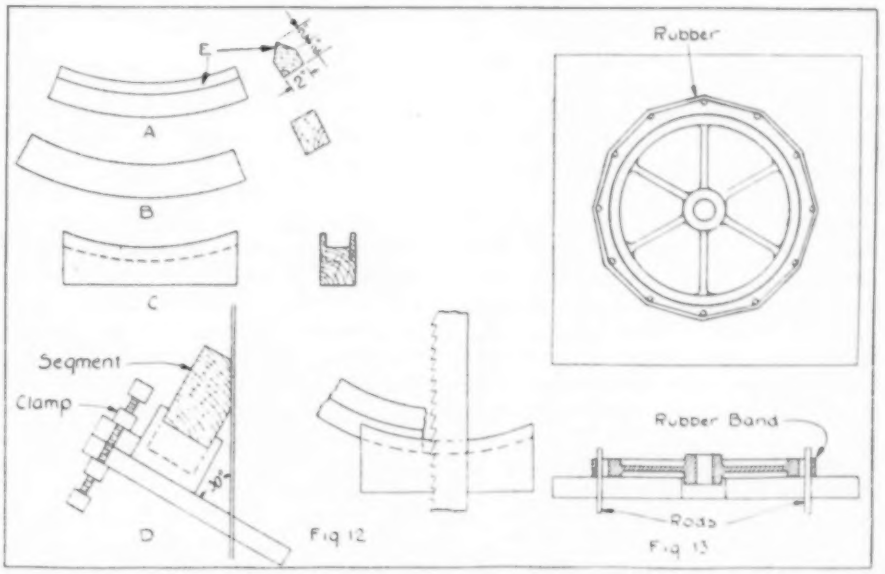

FIG. 12—CUTTING WITH THE JIG FASTENED TO THE TABLE. FIG. 13—METHOD OF PLACING THE RUBBER ON THE WHEEL

row saws showing the width of the saw, the gage and number of teeth, which is as follows:

Width inches	Gage	Teeth points
⅛	22	8
3/16	22	7
¼	22	6
⅜	21	5½
½	21	5
⅝	21	4½
¾	21	4
⅞	21	4
1	20	3½

It is best to order saws by this standard because manufacturers have found through long usage and experiment that this standard is best for ordinary work.

A number of saws are shown in Fig. 3 upon which the widths and number of points are marked. By what has been said before it is selection of a good saw is important and any saw should be given the proper care, not only in placing it on the machine, but in filing and setting. Most of the points about a saw were discussed in a previous article in THE FOUNDRY, but some things well may be repeated. The most important thing about a band saw is to give it enough set and to set the teeth properly. If this is not done, the teeth do not clear the blade and consequently the saw binds and breaks. The tooth never should be set farther down than ½ the tooth and the teeth should all be set parallel to the back of the saw. Fig. 4 shows the proper way of setting the saw. In Fig. 5 the teeth are set so far down in the gullet that the saw may check as considerable power is necessary to bend the tooth and the body is strained. The teeth, set as shown in Fig. 5, force the sawdust down into the gullet and since it cannot get away, it packs there and breaks the saw. Rubber bands should be renewed when worn. The wood should not be forced into the saw. One should not expect to cut cherry as fast as pine.

When filing the saw, the face of the tooth should be given a slight rake. This has a tendency to pull the tooth forward and away from the guide at the back which is a good thing as it keeps the saw from crystallizing. This rake should be slight since, while pine will cut freely with considerable rake, the hard woods require a tooth at approximately right angles to the length of the blade, and in a pattern shop both the soft and hard woods are cut by the same saw.

The author never has seen a band saw filed other than from one side but can see no reason why the principle of filing hand-saws, that is, each alternate tooth filed from either side should not be used.

When a new saw is obtained, the shape of the tooth and amount of set should be noted as the manufacturers have studied the proper tooth shape and it may be followed safely. A combined filing and setting machine may be obtained which is made with a motor or belt drive. This machine files and sets saws from 1/16 to 1½-inch in width and from 3 to 15 points to the inch. The feed is accurate, positive and after being adjusted, it requires no attention. This machine will not file deeper in the braze than at any any other place.

FIG. 14—THE AUTHOR DEMONSTRATING THE THIRD POSITION IN THE FOLDING PROCESS

A brazing clamp is shown in Fig. 6. This device is used to hold the ends of the saw in place on a straight line and the half circle is used to file the bevel and to finish up the braze. In brazing, the two ends are beveled from two teeth to ½-inch in length. The saw then is fastened in position with the setscrews. A thin wire is wrapped around the joint, a piece of silver solder is placed either in the joint or may be laid on top and covered with powdered borax. Tongs may be heated and clamped on the joint but some prefer to use a blowtorch. The heat must be hot enough to melt the solder which may be spread evenly over the surface of the saw at the joint with the end of a file. To further assist in making a good joint, a pair of tongs may be clamped on it after the blowtorch has melted the solder.

In a new type of band saw guide, which has met with approval of band saw users the teeth are held practically stationary with reference to sidewise motion. However, the back of the saw is allowed to swing freely. This is accomplished by a hinge movement which keeps the teeth of the saw in one position while at the back of the saw the roller guide and guide plates swing about that point. The diagram at Fig. 7 illustrates this clearly. The solid lines represent the saw in its natural position and the dotted lines show an angle to which it may swing. Several features are claimed for this device. The entire length of the saw between the pulleys is allowed to swing freely in the rigid guides. Side friction wear on guide plates and the saw almost are eliminated with this swinging guide. It reduces breakage of saws. The saw follows true to line of pressure as curves may be cut without kinking or straining the saw and deep cuts may be made straight from top to bottom without the saw dishing out at the center. There are a number of other good points about this guide. The roller guide causes less friction on the saw, does not stick or groove and does not heat. It does not require oiling as it is packed in grease, and has ball bearings. The ring is reversible, so has two wearing faces. The outer wearing ring is guarded. A clear view may be had of the work going through under the guide. The guide plates are slightly beveled inward at the ends adjacent to the teeth of the saw, thus serving when the saw is accidentally pulled forward, to guide it back into its proper position. No special wrenches are necessary, and all parts are made of malleable iron or steel. A locking device is provided which may be used if necessary to make the guide rigid on certain work.

A large number of jobs, which to the uninformed seem impossible, may be cut on the band saw by jigs. An important acessory to the band saw is an 90 degree angle board which is shown in Fig. 8. This device consists of narrow pine boards glued together to keep the sides straight, with a brace holding the two sides. The sizes given in the illustration are convenient. One side is narrow to care for narrow work so that the guide may be lowered. Thin boards may be sawed easily by holding them up

against the angle which keeps the board in the right position and prevents it from tipping. Fig. 9 may give a clearer idea of what is meant. In this illustration, the table is tipped at an angle. Another use of the angle board is shown at Fig. 10. Particular attention should be paid to this illustration because of the application of this idea to cutting joints and angles or circles. Many joints which otherwise call for extensive layouts may be made easily and quickly. An example of the use of this device may be noted in making a coped point of two cylinders with the branch smaller than the body and at an angle to it. Screw the branch at the angle wanted to the side of the angle board as shown at *A* Fig. 10. A board upon which is drawn one-quarter of the diameter of the body is shown at *B* the board *B* is shown fastened to the edge of the angle board in illustration *C*, and by sawing to the line on *B* the end of the branch also is cut. The branch ready to fit the body is shown at *D*.

Another illustration is found in cutting a core print to fit a pattern as shown in Fig. 11. In this case assume that an opening 12 inches square is wanted and the angle of the pattern is 30 degrees. It must be understood that any shaped hole could be made and that the 12 inches is only an example. On a board, which is 12 inches square, place two braces cut at an angle of 30 degrees and secure the other board, which is to make the print on top of the braces. By sawing the upper or print board and following the outside of the baseboard, the required shape of the print will be made. Another example should serve to demonstrate the possibilities obtained by the use of the band saw, when using jig and forms. In the two previous examples, the jig as well as the work both were moved to obtain the desired cuts; in this case shown, in Fig. 12, the jig is fastened to the table of the saw and the work is moved into the saw by sliding in the jig. The form of the pieces wanted is shown at *A*. The pieces first are sawed to the radii shown at *B*. A jig is made to saw the angle *E* shown at *A*. A piece of wood is secured about 1/64-inch wider than the piece shown in the illustration, or 21/64-inch and a radius equal to the largest or outside radius of *B* is cut. Boards are nailed on each side to guide *B* making the jig shown at *C*. If the angles at *A* are 30 degrees, then the band saw table is tilted 30 degrees in relation to the saw and the jig is placed beside the saw as at *D*. If necessary cut away a small portion of the side of the jig to allow the saw to meet the pieces to be sawed correctly. The jig then is clamped down on the table. The pieces may be pushed through the jig, following the curve of the jig and when one side is sawed, piece is reversed and the other side is sawed in the same manner.

A band saw may be folded in several ways, the easiest being as follows: In a standing position grasp the saw with the hands underneath, that is with the palms up at about the height of the shoulder and about 2½ feet apart. In this position part of the saw rests on the floor while the teeth of the saw are away from the body. Bend the saw toward the body, keeping the curve of the saw bowed and bringing the hands together somewhat, as the saw bends, toward the head, then to the chest and down further until it is about straight down. By this time, the hands have been turned over so that the backs of the hands gradually are coming on top. Cross the saw and while doing so continue the turning of the saw in the same circle as before. When that part of the saw between the hands reaches a horizontal position allow it to fall into the center of the three folds, completing the fold of three circles. The steps in folding the saw are shown in Fig. 14.

A method of placing the rubber band on the wheel may be of interest. Take the wheel off the machine and place it on a layout board or one specially made for this purpose. The board may be several inches larger than the pulley. In the center of the board a hole is bored large enough for the hub of the wheel to drop through, so that the rim of the wheel rests on the board. Then bore about 10 holes outside of the rim in which ⅝-inch rods may be placed. This is shown in Fig. 13. Next draw the rubber over the wheel and then one at a time, pull the rubber over the rods. This gives an opportunity to apply a preparation to the inside of the rubber band and to the face of the wheel. Some use a special preparation. The writer has used heavy shellac with success. Then remove the rods—one at a time and the band tightens up on the wheel. Rub the band with a hammer head to distribute the shellac evenly, leave it over night if possible and then it may be trimmed at the edges.

Faked Foundry Facts

The Dump

Detroit Convention Crowns Apex

(*Concluded from Page* 713)

the Hotel Statler. On Saturday a group picture will be taken at 9 a. m. followed by a shopping tour for the ladies and a plant visitation by the gentlemen. At 2:30 p. m. the party will tour the city in automobiles and at 7 p. m. a complimentary dinner will be tendered.

Sunday the members of the delegation will take a bus trip to Niagara Falls and on return to Buffalo the party will leave Buffalo for Detroit at 6 p. m. on the boat. Arriving at Detroit at 9 a. m. the party will go the Statler which will be the headquarters during its stay. While in Detroit the members of the delegation will attend the technical sessions and exhibition of the American Foundrymen's association. The Detroit committee has arranged numerous plant visitations for the men and social programs for the ladies.

After the close of the convention, a post convention tour will be made. The party will leave Detroit at 7:25 a. m. Sunday, Oct. 3, for Chicago where they will spend Monday and Tuesday. Wednesday and Thursday will be spent in Cleveland, Friday and Saturday in Pittsburgh, Monday in Washington and on Wednesday, Oct. 13, the delegation will sail for home.

The delegates will be entertained in these cities.

The Shakeout

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PAT DWYER, Engineering Editor
FRANK G. STEINEBACH, Associate Editor

CHARLES VICKERS, Nonferrous Editor
EDWIN BREMER, Associate Editor

¶ New Record in Prospect

DETROIT, civic symbol of modern American business life, the throbbing center of the nation's largest industry, is a most fitting scene for the thirtieth annual convention and exhibition of the American Foundrymen's association. This great busy city, the driving force actuating the manufacture of motor vehicles which even in 1923 totaled more than three billions of dollars in value, is recognized for its accomplishments. From the northernmost traveled highway of Lapland to the rock-paved roadways of Rome, Europe knows Detroit and its automotive products. The entire foundry world is conversant with Detroit's high speed foundries, without which the modern automobile would remain a vision yet undreamed. What more propitious setting could have been found for the 1926 A.F.A. gathering which is combined with the second International Foundrymen's Congress, the first to honor America with its sessions.

THOSE foundrymen from abroad who journey across the sea and a third of the way across the American continent to attend the congress will find much of its interest in the convention city. They will visit foundries where thousands of intricate castings are made each day to meet the exacting requirements of automotive service. They will see other shops which by adopting the ideas of precision quality with mass output which automobile construction has taught, have overcome barriers of older methods. But most of all they will profit from the intimate contact with that great moving force in American foundry progress, the American Foundrymen's association.

The benefit of this contact will be mutual. America enjoys no monopoly on foundry knowledge, but that which has come to the foundrymen of this country in manufacturing dexterity is made available unselfishly to the entire industry. The lessons of experience in castings manufacture have been disseminated freely through the American Foundrymen's association and co-operating agencies. From the older countries, the American foundry industry received a heritage of pride of craftsmanship, inidividual skill in molding and casting practice and a large measure of scientific technical knowledge. Members of the American Foundrymen's association are fortunate in the opportunity offered by the Detroit convention to meet and know personally many of the European foundrymen and technical experts who previously have existed in the American mind merely as names famous in the literature of the industry.

THE showing of foundry equipment and supplies this year will surpass in variety and extent any previous exhibition of the A. F. A. It will afford an opportunity for the thousands of visiting foundrymen to become acquainted at first hand with the devices and machinery necessary to modern successful foundry practice.

Every factor upon which an advance estimate can be based points to a new high record in the list of successful American Foundrymen's association conventions. The foundryman who cannot attend at some time during the week of Sept. 27 is unfortunate.

¶ Shows Upward Trend

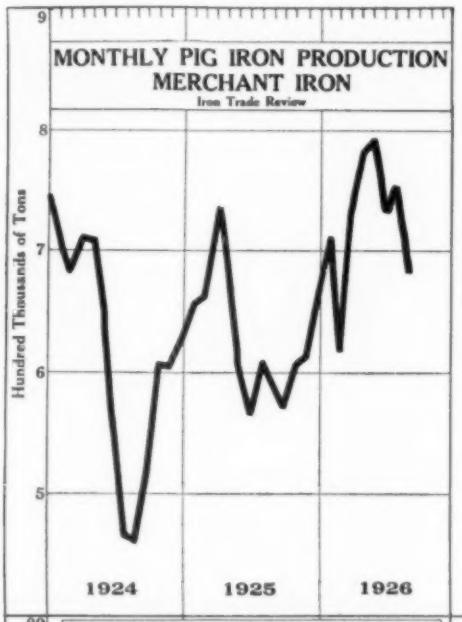
FOUNDRY pig iron production for the first half of 1926 went ahead of the first and the second half year periods of last year, according to statistics just issued by the American Iron and Steel institute. While the increase was not marked, it is sufficient to assure that foundry operations are better than they were last year. The total of foundry iron for January-June, 1926, is given as 2,867,234 tons, compared with 2,736,955 tons for the corresponding six months of 1925. Malleable grades also showed an improvement, the first half of 1926 registering 873,274 tons compared with 740,878 tons for 1925. The production of ferroalloys and the total of all grades of pig iron alike show marked increases, even ahead of the foundry and malleable iron, noted. Pig iron consumption is a fairly reliable indication of business conditions.

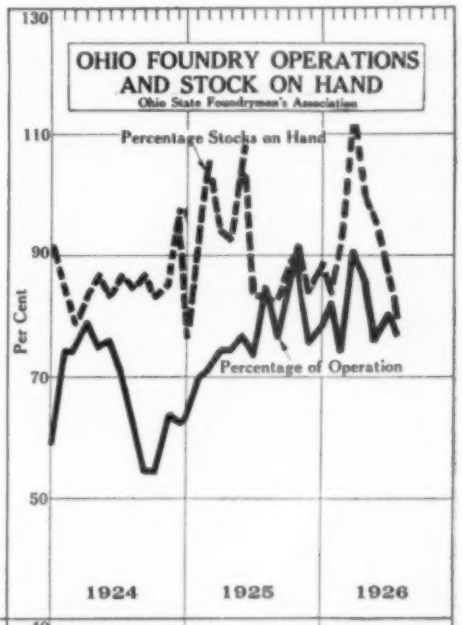
Trade Trends in Tabloid

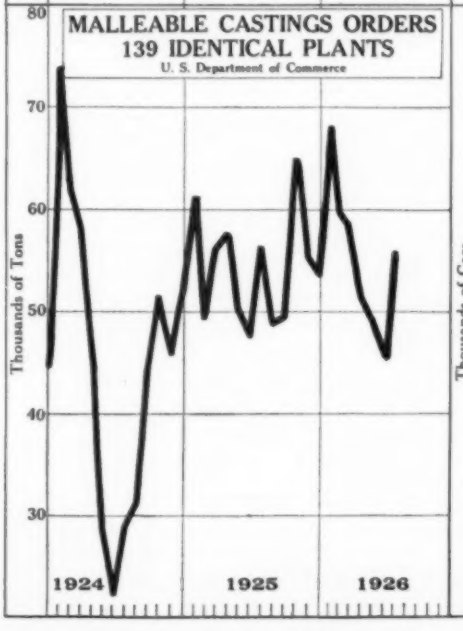
UNINTERRUPTED by the usual summer slack, the fall finds foundry operations in general satisfactory with prospects for slight betterment toward the end of the year. Bookings of steel castings showed a slight upward tendency during July, according to the department of commerce. The total bookings were 64 per cent of capacity for that month, compared with 53 per cent for June. Railway specialties showed a slight advance, but in general, railway business is extremely slack, the car orders for August standing less than 100. Malleable operations in July were slightly above 50 per cent, but bookings increased. The total production of pig iron, according to statistics compiled by *Iron Trade Review* was 3,200,723 tons in August, compared with 3,224,663 tons in July. The merchant iron output was 682,017 tons last month against 750,388 tons for the preceding month. Automobile production declined slightly in July, according to the department of commerce, and failed to reach the total for the corresponding month last year, for first time in 1926. Truck output practically is on the same level in June and July. Average New York monthly prices for nonferrous metals, from *Daily Metal Trade* during August follow: Casting copper, 13.917c; electrolytic copper, 14.452c; Straits tin, 65.288c; lead, 8.925c; antimony, 15.942c; aluminum, 27.00c; and zinc, 7.387c, E. St. Louis, Ill.

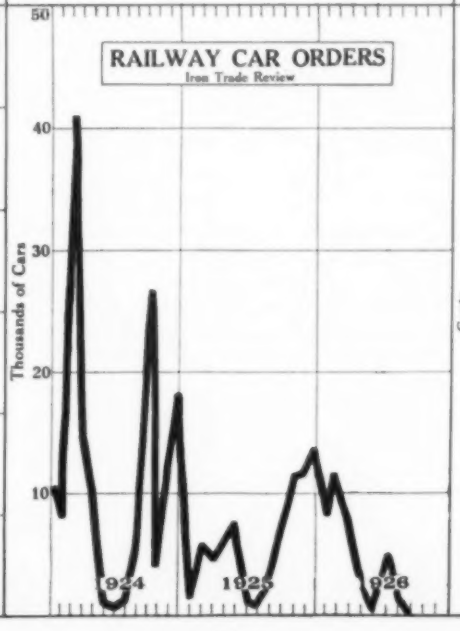
RAW MATERIAL PRICES
Sept. 4, 1926

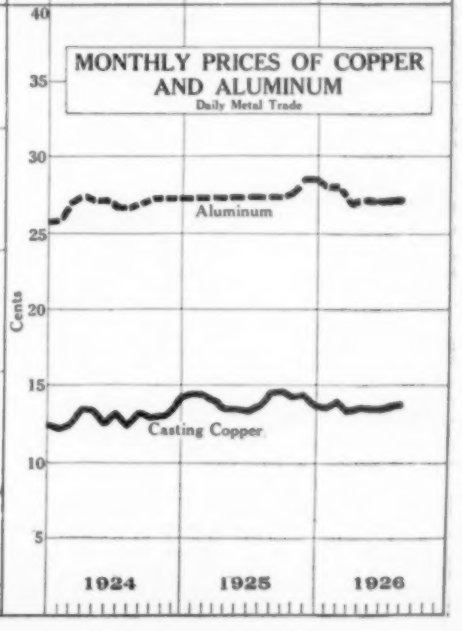
Iron	
No. 2 foundry, Valley	$17.50 to 18.50
No. 2 southern Birmingham	21.00
No. 2 foundry, Chicago	21.00
No. 2 foundry, Philadelphia	21.26 to 21.76
No. 2 foundry, Buffalo	20.00
Basic, Valley	17.50 to 18.00
Basic, Buffalo	19.00
Malleable, Chicago	21.00
Malleable, Buffalo	21.00
Coke	
Connellsville foundry, coke	$4.00 to 4.50
Wise County foundry, coke	4.50 to 5.00
Scrap	
Heavy melting steel, Valley	$18.00 to 18.50
Heavy melting steel, Pitts.	17.50 to 18.25
Heavy melting steel, Chicago	14.00 to 14.50
Stove plate, Chicago	14.75 to 15.00
No. 1 cast, New York	13.25 to 14.00
No. 1 cast, Chicago	17.00 to 17.50
No. 1 cast, Philadelphia	18.00 to 18.50
No. 1 cast, Pittsburgh	17.00 to 17.50
No. 1 cast, Birmingham	16.50 to 17.00
No. 1 cast, Buffalo	16.25 to 16.75
Car wheels, iron, Pittsburgh	17.00 to 17.50
Car wheels, iron, Chicago	16.50 to 17.00
Railroad malleable, Chicago	17.50 to 18.00
Agricultural, mall., Chicago	15.25 to 15.75
Malleable, Buffalo	17.50 to 18.00
Railroad Malleable Pitts.	18.50 to 19.00
Nonferrous Metals	Cents per pound
Casting copper, refinery	13.90
Electro copper, producers	14.32½ to 14.37½
Straits tin	66.00
Lead, New York	8.75 to 8.90
Antimony, New York	16.00
Nickel, electro	39.00
Aluminum, No. 12, prod'rs	26.50
Aluminum, No. 12, remelt	22.50 to 23.00
Zinc, E. St. Louis, Ill.	7.40 to 7.42½











Comings and Goings of Foundrymen

ARCHER A. LANDON who resigned as vice president and assistant to the president of the American Radiator Co., Buffalo, in 1924, recently organized the Landon Radiator Co., North Tonawanda, N. Y. Mr. Landon was born in Detroit in 1868. As a young man he began his career on the railroad and later became a machinist in the Detroit plant of the American Radiator Co. His rise was rapid and after service in several of the plants of the company he removed to Buffalo in 1901 as manager of the Pierce plant. In 1905 he was made general manager of all plants and in 1920 was named assistant to the president. Dur-

C. F. HOPKINS

ing the World war Mr. Landon held four important nonsalaried posts at Washington. He was a member of President Wilson's industrial conference board, chief of the aircraft production board, representative of the National Industrial Conference board, and organizer of the War labor board.

William H. Schulte, for the past six years connected with the American Foundry Equipment Co., Mishawaka, Ind., has resigned to become general superintendent of S. Cheney & Son, Manlius, N. Y., gray iron founders. Previous to Mr. Schulte's connection with the Foundry Equipment company he was with the Arcade Mfg. Co., Freeport, Ill., as foundry superintendent. For several years he has been working with Secretary Hoyt as exhibition superintendent of the American Foundrymen's association.

Frank H. Lamb, proprietor of the Lamb Machine Co., Hoquiam, Wash., has been elected president of the Washington state chamber of commerce.

G. H. Stein, formerly with the Dayton Engineering Laboratories, Dayton, O., as foundry foreman, now is connected with the Wilmington Casting Co., Wilmington, O., as foreman of the core department.

J. A. Lanigan, formerly with the Barberton Foundry Co., Barberton, O., now is foundry manager of the Greenlee Foundry Co., Chicago. Mr. Lanigan for a number of years was general manager of the Portage Foundry Co., Barberton, O., and previous to his new connection was vice president and general manager of the Barberton Foundry Co. for 6 years.

Lee W. Vancleve, formerly president of the Buck Stove & Range Co., St. Louis, will be president of the newly organized St. Louis Stove & Furnace Co., which is a consolidation of the Bridge & Beach Mfg. Co., St. Louis, and the Buck Stove & Range Co. L. H. Beach, formerly president of the Bridge & Beach Mfg. Co., will be vice president of the new firm.

To Entertain Foreigners in Philadelphia

The foregn delegation to the International Foundrymen's convention at Detroit will be entertained by the Philadelphia Foundrymen's association during their stay at Philadelphia. The finance committee under the direction of C. F. Hopkins, chairman, has made extensive plans to make the visit to Philadelphia a memorable one. Mr. Hopkins is vice president of the Ajax Metal Co., Philadelphia, and an authority on nonferrous metals and furnaces. He also is vice president of the Philadelphia Foundrymen's association. Another member of the finance committe, well known to foundrymen, is Wilfred Lewis, president, Tabor Mfg. Co., Philadelphia. Mr. Lewis is one of the old guard who were active in organizing the A. F. A. in 1896. He was graduated from the department of mechanical engineering, Massachusetts Institute of Technology, Cambridge, Mass., in 1875 and entered the works of William Sellers & Co., Philadelphia, that fall. After serving for three years as a machinist, he became a draftsman. Later he was appointed assistant engineer and designer. Mr. Lewis held these positions until 1889 when the Sellers company was incorporated and he became a director. In 1909 he severed his connection to become president of the Tabor Mfg. Co. He is 70 years of age.

Receives Appointment

L. D. Peik has been appointed chief engineer in charge of sandblast and

L. D. PEIK

dust suppression equipment for the American Foundry Equipment Co., Mishawaka, Ind. Mr. Peik, who formerly was chief engineer of the W. W. Sly Mfg. Co., Cleveland, was born in Chilton, Wis., in 1883, and was graduated from the University of Wisconsin, Madison, Wis., in mechanical engineering. For eleven years he was connected with the Bucyrus Co., South Milwaukee, Wis., during which time he contributed many original ideas to the design and erection of some of the first sandblast systems installed in this country. During the World war he was in charge of the Bucyrus department of ordnance equipment with headquarters at Pittsburgh.

For the past seven years Mr. Peik

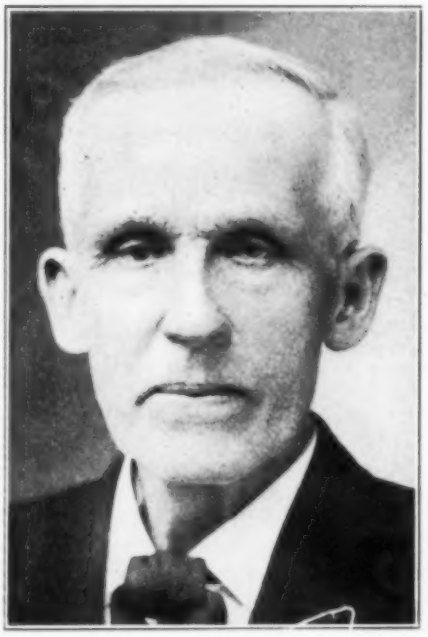
has been active in the organization of the W. W. Sly Mfg. Co. and has developed many features of design in sandblast, dust arrester and other foundry equipment. In his new connection he will redesign sandblast and dust removal apparatus for various classes of service.

Obituary

George A. McLean, who died at his country home at McKean, Pa., on Sept. 1 of paralysis, was born in Allegheny, Pa., about 69 years ago. For many years he was prominent in the iron and steel business at Pittsburgh as a member of the firm of Scott & McLean. After the death of Mr. Scott the firm name was changed to the George A. McLean Co. He was one of the founders and for some time president of the Damascus Bronze Co., Pittsburgh, and for a time was vice president of the Allegheny Steel Co., Brackenridge, Pa. Mr. McLean retired from active business about 20 years ago, and since then divided his time between his farm at Cambridge Springs, Pa., and Florida.

John Strickler Is Dead

John Strickler, 86 years old, former superintendent of Eyster & Weiser, York, Pa., died of pneumonia on Aug. 28. Mr. Strickler began his foundry career in 1852 as an apprentice in the foundry of Slaymaker & Durkee and served this firm and its successors until June, 1924, when he resigned after 72 years of service. At the age of 17 he became a journeyman molder and as became a grown-up man he joined the volunteer fire brigade and during his 69 years of service, served successively as pipeman, chief hose director, foreman, president, trustee and honorary president. In 1859 he joined Capt. Hay's Worth



JOHN STRICKLER

Infantry and saw active service for three months with the Union forces in 1861. In 1908 he was elected city treasurer and served one term in that capacity.

Program Is Arranged

While the program for the sessions of the Metals Section at the fifteenth annual safety congress, which will be held at Detroit from Oct. 25th-29th, inclusive, is not yet arranged in detail, the officers have secured assurances from several prominent speakers that they will deliver addresses. The meetings will be open to both members and nonmembers. A. C. Gibson, chairman of the section, has appointed E. G. Quesnel, of the Commonwealth Steel Co., Granite City, Ill., as chairman of the program committee. Meetings of the section will be held on Tuesday, Wednesday and Thursday of the week of the congress. On Friday morning members of the section will visit the River Rouge Works of the Ford Motor Co. at the invitation of Robert A. Shaw, general safety director of the Ford organizations.

One of the new features will be an exhibition of home-made bulletins which will be shown in the room where the metals section meetings take place. John P. Eib, chairman of the bulletin committee, hopes to receive a large number of contributions to display. That timely safety posters help to prevent accidents has generally been acknowledged.

Among the speakers who are expected to deliver addresses are:

T. H. McKenney, of the Illinois Steel Co., and John A. Oartel, of the Carnegie Steel Co., Harry A. Schultz, of the United States Steel Corp., New York whose topic will be "Every

Foundry Association Directory

The Buffalo Foundrymen
Buffalo

President, J. McARTHUR, Washington Iron Works; secretary, W. J. WARK, E. J. Woodison Co., 146 Chandler street. Meetings the third Wednesday of the month at 146 Chandler street.

Chicago Foundrymen's Club
Chicago

President, CHARLES L. LARSEN, Armour Institute of Technology, 3200 Federal street, Chicago; secretary-treasurer, E. C. BARRINGER, THE FOUNDRY, 1147 Peoples Gas building, Chicago. Meetings second Saturday in each month at the City club, 315 Plymouth court.

Connecticut Foundrymen's Association

President, FRED W. STICKLE, Capitol Foundry Co., Hartford, Conn.; secretary, C. S. NEUMANN, Union Mfg. Co., New Britain, Conn.

Detroit Foundrymen's Association
Detroit

President, ROBERT G. CRAWFORD, Atlas Foundry Co., 131 South Artillery street, Detroit; secretary, RUSSELL M. SCOTT, Packard Motor Co., 1580 East Grand boulevard, Detroit. Meetings third Thursday in each month at the Union League club, 35 Grand River avenue, Detroit.

Metropolitan Brass Foundry Association
New York

President, THOMAS HARPER, Thomas Harper, 204 Lafayette street, New York; secretary, WM. E. PAULSON, Thomas Paulson & Son Inc., 97 Second avenue, Brooklyn, N. Y. Meetings second Wednesday in each month at the Building Trades club, 34 West Thirty-third street, New York.

Newark Foundrymen's Association
Newark, N. J.

President, J. L. CARTER, Barlow Foundry, Inc., Newark; secretary, W. H. MANTZ, Atlas Foundry Co., Irvington, N. J. Meetings called by president.

New England Foundrymen's Association

President, H. P. BLUMENAUER, Arcade Malleable Iron Co., Worcester, Mass.; Secretary, FRED F. STOCKWELL, 205 Broadway, Cambridgeport, Mass. Meetings second Wednesday of each month at the Exchange club, Boston. Outings usually are held in the summer months.

Ohio State Foundrymen's Association

President, WALTER L. SEELBACH, Walworth Run Foundry Co., 2488 West Twenty-seventh street, Cleveland; secretary-manager, ARTHUR J. TUSCANY, 5713 Euclid avenue, Cleveland. Convention Hotel Sinton, Cincinnati, Sept. 16 and 17.

Philadelphia Foundrymen's Association
Philadelphia

President, WALTER WOOD, R. D. Wood & Co., Philadelphia; secretary HOWARD EVANS, J. W. Paxson Co., Luzerne and D streets, Philadelphia. Meetings the second Wednesday of each month at the Manufacturers' club.

Pittsburgh Foundrymen's Association
Pittsburgh

President, LAWRENCE V. STEVENS, Locomotive Stoker Co., N. E. Pittsburgh; secretary-treasurer, WM. J. BRANT, Wm. J. Brant, Bessemer building, Pittsburgh. Meeting on the third Monday of the month, except in July and August, at Fort Pitt hotel.

Quad-City Foundrymen's Association
Davenport, Iowa

President J. H. DIEDRICH, Blackhawk Foundry & Machine Co., Davenport, Iowa; secretary-treasurer, A. D. ZIEBARTH, Davenport Foundry & Machine Co., Davenport, Iowa. Meetings the third Monday evening of each month, the meeting place being rotated between Moline, Rock Island and Davenport.

Southern Metal Trades Association
Atlanta, Ga.

President, GEORGE B. COCKER, Gastonia, N. C.; secretary-treasurer, W. E. DUNN JR., Healey building, Atlanta, Ga.

Tri-City Technical Council
Moline, Ill.

Chairman, H. BORNSTEIN, Deere & Co., Moline, Ill.; treasurer, MAX SKLOVSKY, Deere & Co., Moline, Ill. Combined meetings held only one or two times a year on call.

Tri-State Foundrymen's Association
Cincinnati

President, HAROLD P. RITTER, John A. Oberhelman Foundry Co., 3323 Colerain avenue; secretary, GEORGE W. PIEHL, Wessling Bros. Foundry Co., 1607 McLean avenue. Meetings the second Thursday of each month at the Cincinnati club, Eighth and Race streets.

Twin City Foundrymen's Association
Minneapolis-St. Paul

President, J. A. TEACH, Minneapolis Steel & Machinery Co., Minneapolis; secretary-treasurer, C. E. LANGDON, 3849 Lyndale avenue, So., Minneapolis. Meetings monthly at the Athletic club.

Departmental Head a Safety Director." Clarence H. Howard, president of the Commonwealth Steel Co., who will speak on "Anchoring Safety Process." J. S. Voss, of the Central Steel Co.; E. G. Quesnel, of the Commonwealth Steel Co.; Homer Herron, of the International Harvester Co., J. M. Waltz, of the Youngstown Sheet & Tube Co.; Frank H. Rowe, of the Wheeling Steel Corp.; A. G. Gibson, of the Spang-Chalfant Company; F. C. Bennett, of the Buckeye Steel Castings Co., and J. A. Northwood, of the Bethlehem Steel Company.

Extend Crucible Life

(*Concluded from Page* 745)

or a coke fire. For fuel economy the oven should be lined with asbestos sheet, bolted or cemented on. Ovens of this type to hold two dozen average size crucibles can be built for approximately $30 to $40.

Another simple method of constructing a storage oven, is to use the flues where hard fuel pit furnaces are present. Put up a closed-in sheet iron siding, with a cover over the top and place the crucibles inside where they will benefit by the radiated heat from the flues, and also be protected from drafts.

Other sources of radiated heat around a foundry may be utilized. With any one a simple sheet iron enclosure can be rigged up in practically no time, and at an exense of only a few dollars. It will be a paying investment. It will insure, more than ever before, longer life and more uniform service, from the crucible.

Hot Blast Cupola in Wheel Shop

(*Concluded from Page* 735)

shop equipment on floors provided for the purpose in the clear space beyond both ends of the conveyor.

One of the most interesting features in this foundry is the method of revivifying the molding sand. Clay is used instead of the usual addition of new sand. A small shovelful of fine clay is placed on each cope shortly after the casting is poured. It is claimed the steam from the hot sand helps to disintegrate the clay and assure a more uniform mixture.

Molds are lifted from the conveyor to a raised platform where the sand is knocked out and through a grating into a bin below the floor. The flask is handled by a vibrating bail made by the Stoney Foundry Engineering & Equipment Co., Cleveland. The runner head is knocked from each wheel in turn and immediately the red hot wheel is grabbed by a sling and lowered into one of the battery of annealing pits shown in Fig. 3. The empty flasks are returned to the molding machines either on the conveyor cars or on gravity roller conveyors leading to a point within reach of the monorail cranes serving the cope machines.

Sand is cooled to some extent and wet down on a belt which takes it from the shake-out station to the boot of an elevator which discharges it into a revolving screen shown in Fig. 10. A reciprocating conveyor takes it from the bottom of the screen and deposits it in another elevator which discharges on to an overhead belt that serves the bins over the molding machines.

At the end of the line a stream of sand may be discharged into a muller type of sand mixer made by the National Engineering Works, Chicago. Sand prepared in this machine and mixed with sea coal is used for facing the patterns. The remainder of the sand is used just as it comes from the chutes. A fine riddle is used to deposit the first layer of facing sand and thus secure a smooth skin on the casting. The remainder of the sand is quite coarse and open and requires no artificial venting.

To Hold Autumn Meeting

Sixteen papers were presented at the annual autumn meeting of the Institute of Metals (London) which was held at Liege, Belgium, from Sept. 1 to 4. The papers which were presented follow:

Thursday Sept. 2

"An Account of the Nonferrous Metals Industry in the Liege District," by L. Boscheron, Engis, Belgium.

"The Constitution and Structure of the Commercial Aluminum-Silicon Alloys," by A. C. G. Gwyer and H. W. L. Phillips, Warrington, with an appendix "The Properties of the Modified Aluminum-Silicon Alloys," by D. Stockdale and I. Wilkinson, Warrington.

"Some Mechanical Properties of Silicon-Aluminum Alloys," by J. D. Grogan, Teddington.

"Silumin and Its Structure," by Buntaro Otani, Sendai, Japan.

"Some Further Experiments on the Behavior of Single Crystals of Aluminum under Reversed Torsional Stresses," by H. J. Gough, S. J. Wright and D. Hanson, Teddington.

"Thermal Anomalies of Certain Solid Solutions," by P. Chevenard, Imphy, Nievre, France.

"Preliminary Experiments on the Copper-Magnesium Alloys," by W. T. Cook, and W. R. D. Jones, Cardiff.

"A Comparison of Static and Dynamic Tensile and Notched Bar Test," by Kotaro Honda, Sendai, Japan.

Friday, Sept. 3

"The Deformation of Tungsten Crystals," by C. J. Smithells, H. P. Rooksby and W. R. Pitkin, Wembley.

"Season Cracking in Arsenical Tubes," by A. Pinkerton and W. H. Tait, Birmingham.

"The Action of Hydrogen on Hot Solid Copper," by C. S. Smith and Prof. C. R. Hayward, Cambridge, Mass.

"Bronze Worm Gear Blanks Produced by Centrifugal Casting," by Francis W. Rowe, Huddersfield.

"The Constitution and Age Hardening of Some Ternary and Quaternary Alloys of Aluminum Containing Nickel," by Kathleen E. Bingham, Teddington.

"Development of the Use of Nickel in Coinage," by F. R. Barton, London.

"The Constitution and the Physical Properties of the Alloys of Cadmium and Zinc," by C. H. M. Jenkins, Teddington.

"The Primitive Copper Industry of America, Part 11," by George B. Phillips, Philadelphia.

Plenty of Rooms Are Available in Detroit

Eight thousand rooms still are available in Detroit for accommodations during the American Foundrymen's convention Sept. 27 to Oct. 1, according to W. J. Muhlitner, chairman of the hotel committee, Detroit Foundrymen's association.

To prevent error and to receive immedate attention, the Detroit committee advises addressing all inquiries for reservations to W. J. Muhlitner, chairman of hotel committee, 1368 Penobscot building, Detroit, Mich.

Hold Fall Meeting

The first fall meeting of the New England Foundrymen's association was held at the Exchange club, Boston, Sept. 8. A dinner was served at 6 p. m. Dr. Richard Moldenke spoke on developments in foundry practice.

Tumbling Mill Operates Continuously

The J. W. Paxson Co., Luzerne & D streets, Philadelphia, recently has placed on the market a continuously operating tumbling mill. This mill is being built in three different types to care for three distinct classes of work.

A duplex shell is so formed that the castings may be fed in at one end and the castings and the stars, jacks or wire burrs are carried automatically through the barrel from the entrance to the discharge end. The castings are discharged from the inner shell at the discharge end, while the cleaning elements fall through the perforations of the inner shell and are returned automatically to the feed end of the barrel. The cleaning elements travel in this continuous cycle as long as the mill is in operation.

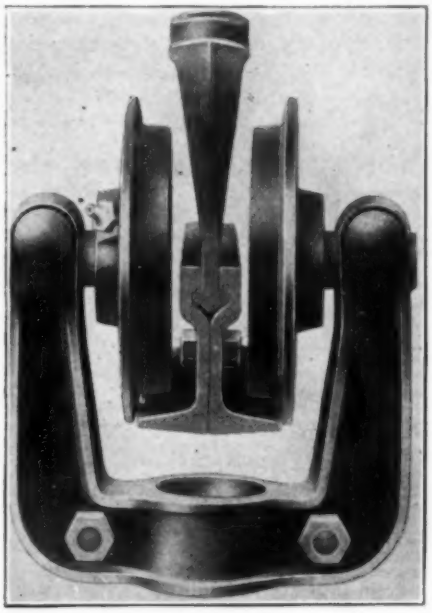
The refuse from the castings during the grinding or abrasive operation passes through the perforated sections of the shells, is deposited in a steel hopper beneath the barrel and then is drawn off by suction. A view of the mill is shown in the accompanying illustration.

Conveyors Made of Thin Steel Sections

American MonoRail Co., West Sixty-seventh and Pear avenue, Cleveland, recently has introduced what is said to be a new and distinctive rail design for overhead hand and power monorail systems. The monorail consists of two thin steel sections rolled from railroad steel and bolted together, back to back, to form a solid rail unit. The disposition of the metal in the two sections has been studied carefully to permit bridging wide spans while the load is sustained without deflection.

The high vertical web of the assembled monorail, it is claimed, gives great carrying strength, while the narrow over all dimensions of 2 inches makes it possible to bend the rail easily in the field to meet any layout requirements.

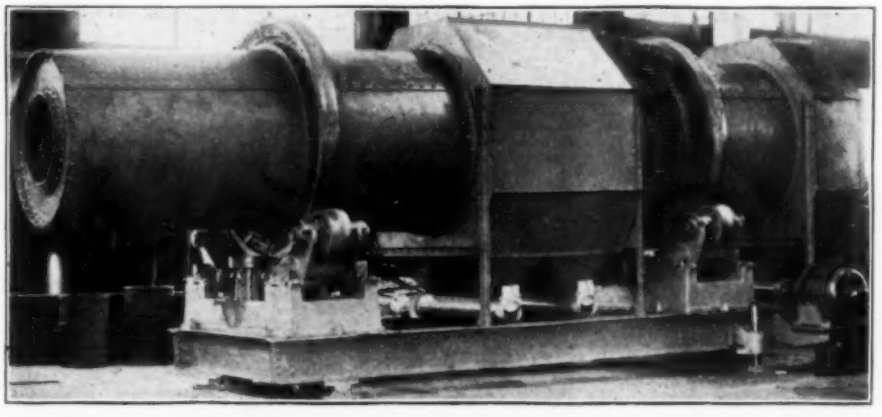
Supporting hangers are steel forgings. They are assembled in the rail head and shipped as a part of the sections. The standard spacing of hangers may be quickly and easily shifted to meet suspension requirements. The hangers are adaptable to plain strap or adjustable bolt suspension. Clamping the hangers inside of the rail head allows ample rail



THE NARROW FLANGE PERMITS EASY BENDING WHEN INSTALLING

tread for trolley wheels and eliminates interference between the wheels and the hangers. Each hanger has a bearing surface of 3¼ inches inside of the rail head.

The connections of the rail are overlapped so that no splice clamps are required. With the connecting joints staggered on opposite sides of the rail, trolley wheels never cross joints on both sides of the runway at the same time. A view of the track, support and the trolley is shown in the accompanying illustration.



CASTINGS ARE DISCHARGED AT ONE END WHILE THE CLEANING ELEMENTS ARE RETURNED TO THE FEED END AUTOMATICALLY

PRESSURE AND SIZE OF TIP REGULATES THE AMOUNT OF PASTE

Pastes Cores and Molds

George H. Bowers, 36 Letchworth street, Buffalo, recently has introduced a machine for applying paste to the surface of cores and molds. This machine consists of a cylinder in which the paste is held. A plunger powered by air from the compressor, forces this plunger down and in turn forces the paste through a hose to the nozzle. A light or heavy layer may be spread, according to the air pressure and the size of the tip. The machine may be used in either the coreroom or on the molding floor and requires little floor space and air pressure. A view of the operator applying paste with this device is shown in the accompanying illustration.

Machine Improves Grain of Abrasives

Efficiency of all abrasive products including grinding wheels, rubbing bricks and the polishing grain, depends principally on the character of the abrasive particles, their size, shape and strength. For some time the efforts of abrasive manufacturers have been directed toward further improvement in these characteristics.

The grain is obtained by crushing the abrasive and screening it. However, a certain percentage of weak ir-

regular grains have appeared and while the percentage has been small, even the smallest percentage is undesirable.

The Norton, Co., Worcester, Mass., has developed a new process using new equipment for treating the alumina and carbide of silicon abrasives which eliminates the weak, flat, silvery grains. The result is an abrasive more uniform in size, more uniform in strength and more uniform in shape.

Grinding wheels made of the improved grain, it is claimed, have an even structure, presenting to the work being ground a greater number of cutting particles, more evenly spaced

PHOTOMICROGRAPH OF ABRASIVE GRAIN SHOWING THE UNIFORMITY OF THE PRODUCT

and more even in strength. It also is pointed out that the more even structure of the wheel decreases the number of necessary dressings. A photomicrograph of the abrasive grain is shown in the accompanying illustration.

Cost Discussion Features Detroit Meeting

The session on foundry cost which is to be held under the auspices of the cost committee will be one of the principal features of the Detroit meeting of the American Foundrymen's association. The committee has secured E. W. McCullough, and R. E. Belt to give the principal addresses for this meeting. Mr. McCullough, the manager of department of manufacturing, of the United States chamber of commerce has had lifetime training in dealing with manufacturing and problems of cost accounting. R. E. Belt, secretary of the American Malleable Castings association is one of the prominent cost consultants of the foundry industry. The cost committee report which is to be presented at this meeting will contain principal elements of foundry cost accounting systems which will be presented for discussion at the meeting.

To emphasize the need for more information regarding foundry costs and to draw attention to the great amount of guess work employed in obtaining foundry cost, the committee will conduct an estimating contest in connection with its exhibit booth. The estimating contest provides for the estimating of production and weights of casting to be produced from patterns which will be on display. Prizes will be provided for the winners in this contest. In the exhibit booth the committee also will have on display information regarding cost accounting methods.

New Sand Required Per Ton of Casting

Question: We should like to know what is considered the proper amount of sand to use to produce a ton of castings.

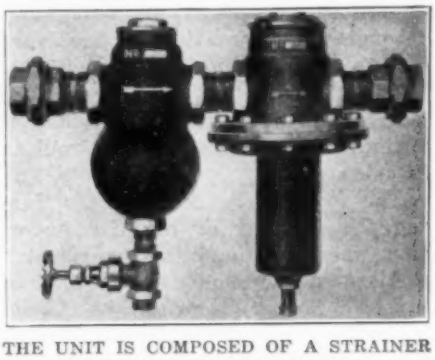
Answer: Your question is not sufficiently specific to be answered definitely. We do not know whether you want to know the amount of new sand required over a given period to correspond with a given output of castings, or, the total amount of sand to be handled each day per ton of castings produced. We shall assume that you have reference to the consumption of new sand. Conditions vary, depending on such factors as the character of the castings, the quality of the sand, and the manner it which it is prepared for use. A rough average estimate of American foundries indicates that the weight of new sand added to the heaps or used for facing is in the proportion of from 12 to 25 per cent of the weight of gray iron castings produced over a given period. In other words from 4 to 8 tons of castings are produced for every ton of new sand placed in use.

In nonferrous foundries and others where the light castings do not burn the sand to any extent the amount of new sand required will be considerably less than 12 per cent of the weight of the castings produced. Where the castings are exceedingly heavy or where an intricate mold face requires a high bond sand, the amount will exceed 25 per cent. Experience has shown that where sand is prepared for use mechanically, a smaller proportion of new sand is required than where the sand is prepared crudely by hand as in ordinary practice.

Reduces Air Pressure

A device for controlling the flow of air in the sandblast machine has been introduced by the Fisher Governor Co., Marshalltown, Iowa. This regulator consists of two standard units made by that company, namely a strainer and a reducing valve. These are coupled closely together so that only a few inches of pipe line is necessary. The regulator is made in the 1 and 2-inch sizes.

It is claimed that sandblast departments usually take air from the same compressor that supplies other departments, which must have a maximum pressure of 100 pounds per



THE UNIT IS COMPOSED OF A STRAINER AND A REDUCING VALVE

square inch, and that sandblast machines operate efficiently at a much less pressure. For this reason, it is stated that by reducing pressures in the sandblast line, an important power economy may be effected.

Opens Branch Office and Service Station

On October first the Chicago Pneumatic Tool C. New York, manufacturer of compressors, engines, complete lines of electric and pneumatic tools, vacuum pumps and accessories in connection there with, will open its new building located in the central manufacturing district on Iron Street near Thirty-eseventh Street, Chicago. This building is the new home of the Chicago sales and service branch.

This structure has been erected with a loading platform on the east side to accomdate two freight cars on the Chicago Junction railway. It also has loading doors for trucks and is designed with all necessary facilities to insure immediate service.

The Hartwell Iron Works, which has been engaged in iron and steel work at Houston, Tex., for 36 years, recently has launched an advertising campaign to users of gray iron castings and structural steel in the Houston trade territory.

Buyers Wait for Exhibition

Orders for Equipment Are Being Held Up Until After the Detroit Show the Last of the Month—Inquiries Indicate Increased Buying Soon

SALES of foundry equipment in August fell off slightly compared with July, although the volume of business compared favorably with that realized during the corresponding month in other years. A further slackening has been noted during the early part of September, but this situation is considered only temporary as conditions in the market indicate an increased buying movement soon.

A number of inquiries now are before the trade and considerable large equipment is being contemplated. However, many buyers are holding off on placing orders until after they have seen the various displays of equipment which will be shown at the exhibition held in connection with the annual convention of the American Foundrymen's association. Manufacturers, in several cases, believe that several of their prospective buyers will close on equipment during the exhibition.

The Chicago foundry equipment market has been experiencing a slight decline in sales volume, but September is expected to show an increase. The number of inquiries is promising and plant operations are steady. Demand in New York territory continues slack.

PITTSBURGH MARKET

Dust Arrester Equipment

Dick Brothers, Inc., Reading, Pa.; from the Pangborn Corp., Hagerstown, Md.

Molding Machines

Darling Valve & Mfg. Co., Williamsport, Pa., portable type; Sun Shipbuilding Co., Chester, Pa., motive type; from the Beardsley & Piper Co., Chicago.

Sandblast Equipment

Dick Brothers, Inc., Reading, Pa., from the Pangborn Corp., Hagerstown, Md.

Sand Preparing Equipment

Fuller-Lehigh Co., Fullerton, Pa.; Jones & Laughlin Steel Corp., Pittsburgh; Ajax Iron Works, Corey, Pa.; sand mixers from the National Engineering Co., Chicago.

CLEVELAND MARKET

Dust Arrester Equipment

Trico Products Corp., Buffalo; Packard Motor Car Co., Detroit; from the Pangborn Corp., Hagerstown, Md.

Molding Machines

E. H. Bardes Range & Foundry Co., Cincinnati, tractor type; J. A. Oberhelman Foundry Co., Cincinnati, motive type; Ironton Bernhard Boiler Co., Ironton, O., portable type; United Engineering & Foundry Co., Canton, O., portable type; United States Radiator Co., Detroit, tractor type; sand throwing machines from the Beardsley & Piper Co., Chicago.

Sandblast Equipment

Trico Products Corp., Buffalo; Ohio Brass Co., Mansfield, O.; Estate Stove Co., Hamilton, O.; from the Pangborn Corp., Hagerstown, Md.

Shakeout Equipment

E. H. Bardes Range & Foundry Co., Cincinnati; Parkersburg Rig & Reel Co., Pomeroy, O., American Radiator Co., Buffalo; shakeout bails; Ferro Machine & Foundry Co., Cleveland, vibrator and shakeout equipment; from the Stoney Foundry Engineering & Equipment Co., Cleveland.

CHICAGO MARKET

Dust Arrester Equipment

Eureka Steel Range Co., Rockford, Ill., from the Pangborn Corp., Hagerstown, Md.

Molding Machines

Columbia Sanitary Mfg. Co., Louisville, Ky., one; Buick Motor Co., Flint, Mich., one stationary type; Wilson Foundry & Machine Co., Pontiac, Mich., three stationary type, one swing type; sand throwing machines from the Beardsley & Piper Co., Chicago.

Sand Preparing Equipment

National Brake & Electric Co., Milwaukee; Union Malleable Iron Co., East Moline, Ill.; Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., four; Mathiew & Sons Foundry Co., Bridgeman, Mich.; sand mixers from the National Engineering Co., Chicago.

Shakeout Equipment

Holland Furnace Co., Holland, Mich.; Standard Sanitary Mfg. Co., Louisville, Ky.; American Manganese Steel Co., Chicago; from the Stoney Foundry Engineering & Equipment Co., Cleveland.

NEW YORK MARKET

Molding Machines

Worthington Pump & Machinery Corp., Harrison, N. J., motive type; Bartlett-Hayward Co., Baltimore, motive type; sand throwing machines fronm the Beardsley & Piper Co., Chicago.

Sandblast Equipment

General Electric Co., Bloomfield, N. J.; from the Pangborn Corp., Hagerstown, Md.

NEW ENGLAND MARKET

Cranes

Dust Arrestor Equipment

Furnaces

Farrel Foundry & Machine Co., Ansonia, Conn., one 84-inch and one smaller cupola from the Whiting Corp., Harvey, Ill.

Sandblast Equipment

H. L. Judd Co., Inc., Wallingford, Conn.; New York, New Haven & Hudson River Railroad Co., New Haven, Conn.; from the Pangborn Corp., Hagerstown, Md.

New Trade Publications

LUBRICATION—The Shepard Electric Crane & Hoist Co., Montour Falls, N. Y., has issued a bulletin on the lubrication of cranes and hoists manufactured by this company.

GRINDING AND POLISHING—Flexible grinding and polishing, using cloth, felt, leather, etc., wheels and abrasive grain are described in a booklet published by the Norton Co., Worcester, Mass.

MOTORS—The General Electric Co., Schenectady, N. Y., has issued two folders showing the main constructional features of its wound rotor induction motor and its direct current, enclosed type crane and hoist motor.

FANS AND BLOWERS—Buffalo Forge Co., Buffalo, has issued a pamphlet describing its small conoidal pressure fans and one on its electric blowers. Ratings and constructional data are given.

GRAPHITE BRUSHES—Various types of commutator brushes manufactured by the United States Graphite Co., Saginaw, Mich., are shown in a catalog recently issued. Sizes, grades and characteristics of each type of brush are given.

OVENS—Indirect air heated ovens for enameling, drying and baking manufactured by the McCann-Harrison Corp., Cleveland, are shown and described in a catalog just published. Specifications are given and some industrial installations are shown in illustrations.

POLISHING AND BUFFING LATHES—The Crown Rheostat & Supply Co., Chicago, has issued a booklet describing its ball bearing lathes for polishing and buffing. These lathes may be secured in either belt driven or gear driven electric types.

COAL CRUSHERS—Crushing of lump or run of mine coal to stoker sizes is described in a recent bulletin of the Webster Mfg. Co., Chicago. Single and double roll crushers are described and illustrated. Prices, dimensions, and capacities are given.

GRINDING SPINDLES—Ex-Cell-O Tool & Mfg. Co., Detroit, has issued a new catalog of its grinding spindles equipped with high speed ball bearings. Spindles are listed for several standard grinders, and full specifications are included.

SPACE HEATERS—Heating units in convenient forms for industrial and commercial purposes are described in three pamphlets issued by Edwin L. Wiegand Co., Pittsburgh. These units may be secured in various sizes and in the form of immersion, strip and space heaters.

GRINDING MACHINES—Four catalogs have been issued by the Norton Co., Worcester, Mass., describing cylindrical and universal type grinding machines manufactured by the company. Sizes, features of construction and specifications of the various machines are given.

PORTABLE DRUM HOISTS—An illustrated booklet showing the application of the air turbine and electric portable drum hoists manufactured by the Sullivan Machinery Co., Chicago, has been published. The hoists may be used for a variety of purposes in hauling or lifting.

ELECTRIC CRANES—The Whiting Corp., Harvey, Ill., has issued two new bulletins, one on electric traveling cranes and the other on drop pit tables. The first gives the standard clearances for this type of crane, and the other shows the results obtained from the use of a drop pit table.

TRANSFORMERS—Descriptions of distribu-

tion and small power transformers are given in a 72-page catalog issued by the General Electric Co., Schenectady, N. Y. Tabulated capacities, catalog numbers and other data are given. Constructional features are shown in diagram and illustration.

CEMENT—The General Refractories Co., Philadelphia, has issued a folder on a new refractory cement it has developed. The base of the cement is chromite, and it is claimed no sodium silicate or low fusion binders are used. This cement may be used for metallurgical purposes and in furnaces or boiler settings.

MILL EQUIPMENT—The Hill Clutch Machine & Foundry Co., Cleveland, has issued thee catalogs describing machinery and equipment manufactured by this company. One catalog describes shafting and bearings, another describes clutches, pulleys and belt tighteners, and the third catalog describes rope drives, gears, speed transformers and sprockets.

FLEXIBLE SHAFT EQUIPMENT—Various types of flexible shaft equipment, portable tools and labor saving devices manufactured by the R. G. Haskins Co., Chicago, are shown in its recent catalog. Descriptions, sizes and accessories are given. Applications of the machines in industry are shown by illustrations.

SUCTION TORCH—A bulletin has been issued by Hauck Mfg. Co., Brooklyn, N. Y., describing a suction torch recently placed on the market. It operates without the necessity of maintaining pressure on the oil supply tank, thus eliminating an element of danger. Details of the new type of torch are presented.

DRILLS, GRINDERS AND BUFFERS—The United States Electrical Tool Co., Cincinnati, has published a new catalog showing the various machines manufactured by the company. Features of construction are shown, specifications and equipment for the machines are given. These machines may be used for a variety of purposes in grinding, polishing and buffing.

FIREPROOF FLOOR—A report has been issued by the Massillon Steel Joist Co., Canton, O., covering an unusually thorough test made by the Pittsburgh Testing Laboratory on a panel of floor using the Massillon company's materials. In the test the standard panel was built over an oil-fired furnace, thermocouples were imbedded at 14 points in the air spaces surrounding the joists and directly under the panel. The furnace temperature was raised rapidly to 1800 degrees Fahr. and held for four hours and 28 minutes. The slab was fully loaded to its designed rating, 125 pounds per square foot. Deflections and temperature readings were taken at 10-minute intervals throughout the test.

What the Foundries Are Doing

Activities of the Gray Iron, Malleable, Steel and Brass Shops

Barberton Foundry Co., Barberton, O., is having plans drawn for a new foundry plant.

Cumberland Foundry Co. Inc., Cumberland, Md., has been incorporated with $50,000 capital by Roy Lentz and Augustus Markham.

Johnson Bronze Co., New Castle, Pa., will build an addition to its machine shop to enlarge capacity for finishing its product.

Union Iron Works, 217 East Montgomery street, Spokane, will build a 1-story blacksmith and forge shop.

East Penn Foundry Co., Macungie, Pa., is building an addition to its foundry and is enlarging and improving other departments.

C. F. Braun Co., Alhambra, Calif., manufacturer of valves and heaters, will bulid a 1-story addition.

Stedman Foundry & Machine Co., Aurora, Ind., is building a 1-story addition for foundry use, 27 x 180 feet.

Elizabeth Foundry Co., 712 Princeton avenue, Elizabeth, N. J., will build a 1-story foundry addition.

Shaw Pattern Co., Cleveland, now is operating its new shop at St. Clair avenue and East Second street.

Gamon Meter Co., 282 South street, Newark, N. J., manufacturer of valves and water meters, will build a 1-story addition to its plant.

William Highton & Sons Co., Nashua, N. H., manufacturer of automobile locks and hardware, will rebuild its burned plant and replace equipment.

Manhattan Die Casting Corp., 92 Twenty-second street, Long Island City, N. Y., suffered loss by fire to stock and equipment which will be replaced.

Detroit Brass & Malleable Works, Wyandotte, Mich., A. Dugrey general superintendent, is equipping a hot-dip galvanizing plant for pipe fittings.

Gastonia Roller Covering Co., Gastonia, N. C., has been incorporated with $100,000 capital to build and operate a foundry by O. P. Hord and M. G. Hord.

L. C. Reynolds, Greenville, Tex., will build a foundry 50 x 100 feet on East Jordan street to manufacture sawmill equipment and grate bars.

Landon Radiator Co., North Tonawanda, N. Y., has been incorporated with $500,000 capital and 20,000 shares no par value to manufacture radiators by A. A. Landon, G. F. Rand and S. H. Knox. E. H. Letchworth, Buffalo, is attorney.

Wagner Malleable Iron Co., 751 North Lowber street, Decatur, Ill., A. W. Wagner president, is considering sketches for a 1-story annealing building 75 x 125 feet.

Dixie Brass & Foundry Co., Thirteenth street and Sixth avenue, Birmingham, Ala., A. M. Shook Jr., president, is building an iron foundry.

Anderson Brass Works, 700 North Forty-fourth street, Birmingham, Ala., has let contract to Ingalls Iron Works Co., Birmingham, for 1-story plant 68 x 105 feet for nonferrous foundry. (Noted March 15.)

Link Belt Co., Indianapolis, Alfred Kauffman president, Belmont avenue and Big Four railroad, has let contract to John R. Curry Construction Co., Empire Life building, for a 2-story addition 80 x 100 feet.

Triangle Tool & Pattern Co., 207 Brady avenue, Detroit, T. H. Barkley manager, has let contract to F. M. Stokes, 6432 Northfield avenue, for a 1 and 2-story plant 50 x 100 feet.

Kingston Brass Foundry Co., Union City, N. J., has been incorporated with $100,000 capital by Charles C. Kingston, Bayonne, N. J.; Walter B. Williams and Theodore D. See, Jersey City. C. E. Stewart, Jersey City, is attorney.

New Haven Foundry, New Haven, Mich., has been incorporated with $10,000 capital and 5000 shares no par value to manufacture castings of iron and other metals by W. L. Jenks, Sumner Lamkins and Gus Hill, 1327 Pine Grove avenue, New Haven.

Thomas Devlin Mfg. Co., Lehigh avenue and Third street, Philadelphia, hardware specialties, has let contract to the Austin Co. for a 1 and 2-story addition to its plant at Burlington, N. J., 42 x 100 feet 50 x 175 feet for a machine and galvanizing shop.

Fitchburg Mining Machine Corp., Fitchburg, Mass., has been incorporated with $480,000 capital and 2000 shares no par value to manufacture iron, steel and other metals and machinery, by Robert D. Gould president, Leominster, Mass., Alton F. Tupper and Arthur F. Goodman.

Mechanical Specialties Mfg. Co., 1619 Washtenaw avenue, Chicago, has been incorporated with $25,000 capital to manufacture machinery, appliances, castings and implements by Sam McCallen, Hattie R. McCallen and Ruth Lange. Jenkins & Kirkpatrick, 1775 Transportation building, are correspondents.

Standard Foundry Co., Racine, Wis., manufacturer of automobile cylinder castings, is building additions to double its floor space. A foundry unit 110 x 220 feet is under construction, served by a new core room recently completed. The present foundry building will be used as a cleaning room. The company is operating under lease the foundry of the Case Plow Works, Inc., in addition to its own plant.

Niagara Falls Smelting & Refining Corp., Buffalo, has placed contracts for three new buildings: one warehouse 55 x 60 feet, laboratory building 22 x 51 feet, repair department building 34 x 46 feet. Bids on an addition, 60 x 65 feet, to its main smelting building are being called for. Three new furnaces have been purchased and five more are being figured on. One electric crane has been installed and two more are required. In addition the firm has installed 1200 feet of overhead track for conveying materials. Other additional equipment will be added as fast as construction of buildings will permit.

Consolidation of the Central Brass Mfg. Co. and the Paragon Brass Mfg. Co., both of Cleveland, has just been effected, according to an announcement by Edgar A. Eckhouse, president of the Central company. In the future the Paragon company will be operated as a division of the Central company. The Central plant at 2950 East Fifty-fifth street is being enlarged to take care of the Paragon producton which up to the present time has been carried on at 2535 East Seventy-ninth street. This plant will be abandoned. Manufacture of the Paragon company's line of plumbing fixtures, etc., will be carried on in the future under the Paragon name. Associated with Mr. Eckhouse in the official family of the consolidated companies are Harry H. Klein, Leo Jack and Milton W. Bernstein. Both the Central company and the Paragon company were incorporated in 1895.